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NATIONAL CONFERENCE DETAILS

A DETECTION OF AMBLYOPIA USING RANDOM FOREST CLASSIFIER ALGORITHM

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ABSTRACT

Amblyopia is an eye disease occurred due to the failure of interconnection between the brain and the eye. It typically affects the vision of children and kids. Amblyopia is a formative issue that influences the spatial vision of one or the two eyes without an undeniable natural reason; it is related with a past filled with irregular visual experience during childhood. In this paper we proposed the Random Forest Classifier (RFC) algorithm for finding and detecting the amblyopia by using Random Forest Classifier (RFC) algorithm. The Input parameters taken as for the sample dataset are namely gender, age, cataract, myopia, hyperopia, strabismus, and class.

Keywords: Amblyopia, Eye, Disease, Image Processing and RFC

I. INTRODUCTION

Iris acknowledgment is a robotized strategy for biometric distinguishing proof that utilizes scientific example acknowledgment strategies on video pictures of either of the irises of a person's eyes, whose mind boggling designs are one of a kind, stable, and can be seen from some separation.

Retinal filtering is an alternate, visual based biometric innovation that utilizes the one of a kind example on an individual's retina veins and is frequently mistaken for iris acknowledgment. Iris acknowledgment utilizes camcorder innovation with inconspicuous close

to infrared brightening to obtain pictures of the detail-rich, mind boggling structures of the iris which are obvious remotely. Computerized formats encoded from these examples by numerical and measurable calculations permit the recognizable proof of an individual or somebody claiming to be that person. Databases of selected formats are looked by matcher motors at speeds estimated in the a great many layouts for each second per (single-center) CPU, and with strikingly low bogus match rates.

A few hundred million people in a few nations around the globe have been taken a crack at iris acknowledgment frameworks for comfort purposes, for example, identification free mechanized fringe intersections and some national ID programs. A key bit of leeway of iris acknowledgment, other than its speed of coordinating and its outrageous protection from bogus matches, is the steadiness of the iris as an inner and ensured, yet remotely noticeable organ of the eye.

1.1 EYE DISEASE IDENTIFICATION

A great many people have eye issues one after another or another. Some are minor and will leave all alone, or are anything but difficult to treat at home. Others need a pro's consideration. Regardless of whether your vision isn't what it used to be, or never was that incredible, there are things you can do to get your eye wellbeing in the groove again. Check whether any of these regular issues sound recognizable. Furthermore, consistently check

with a specialist if your indications are downright terrible or don't clear up inside a couple of days.

1.2 STRUCTURE AND FUNCTION OF THE EYE

In the optical sciences, the natural eye is frequently contrasted with a camera. Light reflected from an item is centered around the retina in the wake of going through the cornea, student and focal point, which is like light going through the camera optics to the film or a sensor. In the retina, the approaching data is gotten by the photoreceptor cells committed for distinguishing light. From the retina, the data is additionally transmitted to the mind by means of the optic nerve, where the impression of sight is created. During the transmission, the data is prepared in the retinal layers. A cross-area of the eye and the structures engaged with the picture development are introduced in Fig. 1.2.1.There are three significant highlights in the camera which can be seen undifferentiated from the capacity of the eye: opening, camera focal point, and the camera sensor. In the eye behind the straightforward cornea, the hued iris directs the measure of light entering the eye by changing the size of the student. In obscurity, the understudy is huge permitting the greatest measure of light to enter, and in the brilliant the student is little forestalling the eye to get an overabundance measure of light. Similarly, the camera directs the measure of light entering the camera with the gap. Arranged by the eye to concentrate on objects at different separations,

the ciliary muscle reshape the flexible focal point through the zonular filaments. For objects in short separations, the ciliary muscle contracts, zonular filaments slacken, and the focal point thickens into sphere formed which results high

refractive force. At the point when the ciliary muscle is loose, the zonular filaments stretch the focal point into slim molded and the inaccessible.
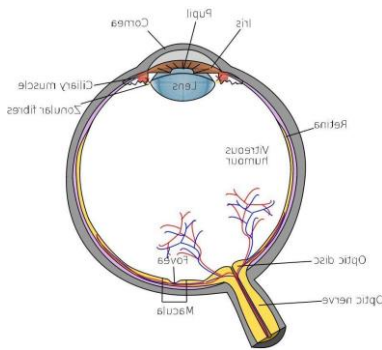
Figure 1.2.1: Cross-section of the eye.

This compares to the capacity of central length, for example the separation between the focal point and sensor, when centering the camera. In the event that the eye is appropriately engaged, the light passes through the vitreous gel to the camera sensor of the eye, that is the retina. The retina is the internal surface of the eye and comprises of straightforward tissue of a few layers of cells assigned to retain and change over the light into neural signs. The request for the retinal layers is

impossible to miss since the transformation is done by the light recognizing photoreceptor cells on the layer which is in the rear of the retina and farthest from the light.

Hence, the light needs to go through the retinal layers before it comes to the photoreceptor cells. When the light is identified, changed over and the neural signs gathered to the optic nerve, the driving forces are at long last transmitted to the mind. During transmission from the

photoreceptor cells to the optic nerve the electric driving forces are additionally handled in the internal layers of the retina. The nitty gritty focal vision is framed in the macula which is an exceptionally light touchy territory 5 to 6 mm in measurement in the focal locale of the retina. In the focal point of the macula is a round formed zone known as fovea, where the cones are solely

Figure 1.2.2:Amblyopia.

II. MATERIALS & EXPERIMENTAL PROCEDURES

Philosophy Method Utilized In This Paper Can Be Ordered In Two Stages

- ➢ Image processing and feature extraction
- ➢ Supervised learning

2.1 IMAGE PROCESSING AND FEATURE EXTRACTION

This is the most significant advance of the task as surfaces got will be taken as info material for neural nets which will order the pictures in their particular classes.

2.2 IMAGE COMPRESSION

As should be obvious there are various kinds of pictures in dataset with various goals,

found. The cones are photoreceptor cells specifically touchy to various frequencies of light. Close to the macula is the start of optic nerve (optic nerve head or optic plate), from where the fundamental corridor and vein rise in the retina. There are no typical retinal layers.

distinctive camera quality and various sizes. My work is to order them in various classes. So first issue it confronted was identified with heterogeneity of the dataset**.**

2.3 FEATURE EXTRACTION

This is last picture preparing step for the venture. In this progression it will initially separate border from each of the three layers and afterward remove territory of three layers.

CANNY EDGE LOCATION

In this progression we continue towards discovering edges of every one of the 3 layers. This is finished by vigilant edge recognition. In watchful edge location gaussian channels are

applied at that point utilizing twofold edge of force variety part is distinguished.

THRESHOLDING

This progression is applied on transformed pictures which gives zone of the 3 layers. This is finished by versatile thresholding. I have additionally taken a stab at utilizing otsu's thresholding and straightforward thresholding yet later is giving better regions then other two.

2.4 CLASSIFICATION

This is the last piece of the entire procedure. In this part initially adjusted classes are made by utilizing above pictures and afterward they are given as contribution to neural nets alongside marks. This on yield gives anticipated names.

2.5. IMPLEMENTATION OF KNN ALGORITHM USING PYTHON

- ➢ HANDLING THE INFORMATION
- ➢ CALCULATE THE SEPARATION
- ➢ FIND K CLOSEST POINT
- ➢ PREDICT THE CLASS
- ➢ CHECK THE PRECISION

2.6 LOGISTIC REGRESSION

Calculated regression produces brings about a paired organization which is utilized to foresee the result of a clear cut ward variable. it is most generally utilized when the reliant variable is parallel i.e, the quantity of accessible classifications is two, for example, the typical yields of strategic relapse are

- ➢ Yes and No
- ➢ True and False
- ➢ High and Low
- ➢ Pass and Fail

2.7 Implementation of Random Forests Classifier Algorithm Using Python for Detecting Amblyopia Eye Disease

A Random Forest (RF) is a regulated learning calculation. It tends to be utilized both for grouping and relapse. It is additionally the most adaptable and simple to utilize calculation. A backwoods is involved trees. It is said that the more trees it has, the more hearty a Forest. Random Forest makes choice trees on arbitrarily chose information tests, gets forecast from each tree and chooses the best arrangement by methods for casting a ballot. It likewise gives a really decent marker of the element significance.

A Random Forest has an assortment of utilizations, for example, proposal motors, picture grouping and highlight choice. It tends to be utilized to order faithful credit candidates, recognize deceitful movement and foresee ailments. It lie at the base of the Boruta calculation, which chooses significant highlights in a dataset.

2.8 How does the algorithm work?
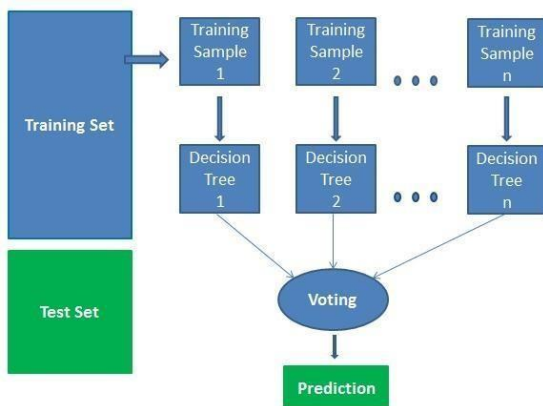
Figure 2.1: Random Forests Classifier Algorithm

It works in four steps:

Step1: Select random samples from a given dataset.

Step2: Construct a decision tree for each sample and get a prediction result from each decision tree.

Step 3: Perform a vote for each predicted result.

Step 4: Select the prediction result with the most votes as the final prediction.

Fast Facts on Amblyopia

Symptoms of lazy eye include blurred vision and poor depth discernment.

> ➤ Lazy eye isn't an issue with the eye, however the associations with the cerebrum.

> ➤ Amblyopia can be brought about by various elements, including a muscle awkwardness or eye infection.

> ➤ Treatment can be viable and the sooner it starts, the better.

Treatment

> ➤ Amblyopia is a relatively common problem.

> ➤ Treatment tends to be more effective the younger the child is effective.

> ➤ After a child is 8 years old, the likelihood of vision improvement drops significantly but can still be effective.

There are two approaches to lazy eye treatment:

➢ Treatment an underlying eye problem

➢ Getting the affected eye to work so that vision can develop

Treatment for underlying Eye problems

Numerous kids who have inconsistent vision, or anisometropia, don't realize they have an eye issue in light of the fact that the more grounded eye and the mind make up for the setback. The more vulnerable eye deteriorates, and amblyopia creates.

A youngster with partial blindness, far-sightedness, or astigmatism will be endorsed glasses. The kid should wear them constantly with the goal that the expert can screen how powerful they are at improving the vision

the vision to the more vulnerable eye. For this situation, the standard treatment is medical procedure to lift the eyelid.

Getting the languid Eye to work:

When the vision is adjusted and any hidden clinical issues are tended to, at that point there are a few different moves that canbe made to help improve vision.

Impediment or utilizing a fix:

A fix is put over the "great" eye so the sluggish eye needs to work. As the mind is just getting data from that eye, it won't disregard it. A fix won't dispose of an eye turn, yet it will improve vision in the lethargic eye.

The length of treatment relies upon

issues in the sluggish eye. Glasses may likewise address an eye turn. In some cases, glasses can understand the amblyopia, and no greater treatment is required.

It isn't unprecedented for kids to gripe that their vision is better when they don't wear the glasses. They should be urged to wear them for the treatment to be powerful.

Waterfall medical procedure:

On the off chance that a waterfall is the reason for amblyopia, it very well may becarefully evacuated under either nearby or general sedation.

Revising sagging Eyelids:

For certain individuals, amblyopia is brought about by an eyelid that is obstructing

numerous components, including the kid's age, the seriousness of their concern, and the amount they stick to the authority's directions. The fix is generally worn for a couple of hours every day. A youngster ought to be urged to do quit for the day while wearing the fix, for example, perusing,shading, or homework.

Atropine Eye drops:

These might be utilized to obscure vision in the unaffected eye. Atropine widens the understudy, bringing about obscuring when seeing things close up. This makes the lethargic eye work more. Atropine is typically less prominent and unbalanced for the kid, contrasted and a

fix, and can be similarly as compelling. Youngsters who can't endure wearing a fix might be endorsed

eye drops.

Vision Exercises:

This includes various activities and games planned for improving vision improvement in the youngster's influenced eye. Specialists state this is useful for more seasoned kids. Vision activities might be done in blend with different medicines.

Medical procedure:

At times, eye medical procedure is performed to improve the presence of an eye

➢ Random woodlands can likewise deal with missing qualities. There are two different ways to deal with these: utilizing middle qualities to supplant ceaseless factors, and registering the vicinity weighted normal of missing

III.   RESULTS AND DISCUSSION

The result and discussion for using Random forest Classifier algorithm explain the following terms.

For Feature Gender:

In amblyopia affect the feature years boys compare with the girls. The boys vision have un accuracy compare with girls vision.

For Feature Gender:
IV. CONCLUSION

Amblyopia is common in the pediatric population, affecting 2-5% of

turn, bringing about better arrangement of the eyes. This could possibly improve vision.

2.9 Favorable circumstances:

➢ Random woods are considered as an exceptionally precise and vigorous strategy due to the quantity of choice trees taking an interest all the while.

➢ Doesn't experience the ill effects of the over fitting issue. The principle reason is that it takes the normal of the considerable number of expectations, which counteracts the inclinations.

➢ The calculation can be utilized in both grouping and relapse issues.

qualities.

➢ You can get the relative element significance, which helps in choosing the most contributing highlights for the classifier.

In Age wise it affect more in the age of Six, in that period the more number of child affected by amblyopia.

For   Feature   Cataract,   Myopia, Hyperopia,Strabismus:

In the Cataract, Myopia, Hyperopia, Strabismusthe vision un accuracy is more and accuracy , good, very good is very low

children. With early screening endeavors

andfitting treatment, great visual results can

be   accomplished.   The   United   States

Preventive Services Task Force suggests vision screening for all patients matured 3 to 5 years. In this method easily identified and we can able to detect the

.

V. FUTURE SCOPE

In the forthcoming days there would be chance for getting the inputs dynamically from the patients, including several that have reached the clinical trial stage there is hope that applying our knowledge of visual

amblyopia earlier and achieve the best accuracy rate. In future, amblyopia is easily identified by using various systematic approaches

cortex plasticity will lead to a breakthrough in treating amblyopia in childhood and beyond in the not too distant future.

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A NEW APPROACH TO CONTROLLING METHANE CROP FIELD PREDICTION BASED ON SMART AGRICULTURE USING ML AND IOT

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ABSTRACT

Agriculture is a key monetary purpose pressure. People rely on an extensive type of agricultural products in almost all aspects of their lifestyles. Farmers want to address climate exchange and meet growing needs for extra meals for higher meals fine. In order to boost the yield and growth of crops, the farmer needs to be privy to the climatic conditions, consequently assisting its preference of developing the ideal crop, below those factors. One of the maximum large effects these days in each area of package ranging from leisure to scientific technology has been credited to device mastering techniques and IoT. IoT-primarily based Smart Farming improves the complete Agriculture computing device by using a useful way of tracking the arena in actual time. It continues with different factors like humidity, temperature, soil, and so forth. Below take a look at and offers a crystal- clean real-time observation. The robustness of tool getting-to-know strategies and computational strategies furnished smooth, accurate, updated future predictions Machine Learning in agriculture is used to enhance the productiveness and terrific of the crops within the agriculture region. Machine Learning in agriculture is used to enhance the productivity and extremely good of the plant life inside the agricultural area.

Keywords: IoT, Machine Learning, Crop yield.

INTRODUCTION

Agriculture is a substantial source of revenue for India's largest population, and it plays an important role in the country's economic system. It has been observed that crop development in the agricultural region has been slow over the last ten years. Food prices are always rising as crop prices fall. This is due to a multitude of factors. Water waste, low soil fertility, fertiliser usage, illnesses, climate change, and a variety of

other issues could all be to fault. Wi-Fi sensor networks and IoT integration give a powerful intervention in agriculture that can be quite beneficial. The Internet of Things is a method of connecting everything to the internet by connecting objects or gadgets that are no longer connected (such as cars, homes, digital devices, and so on). The distinct underlying purpose of IoT is to ensure the timely delivery of accurate records to the relevant persons. Irrigation is a critical issue in agriculture because to the inconsistent and unpredictable nature of monsoon rainfall. The term "smart agriculture" refers to a broad category of food production processes that are aided by the Internet of Things, big data, and advanced analytics. When considering the Internet of Things, adding sensing, automation, and data generation to present agricultural processes is a hot issue (IoT). The following IoT packages are the most popular in smart agriculture. A) Sensor-based systems for monitoring crops, soil, fields, livestock, storage facilities, and nearly any other key element affecting production.

B) Drones, autonomous robots, and actuators are examples of smart agricultural vehicles.

C) Hydroponics or intelligent greenhouses can be used to connect agricultural spaces.

D) Analytics, visualisation, and security procedures, Future planning and simulation.

The ideal yield estimate for the numerous plants included in the planning process is a major concern for agricultural output and necessity. In recent years, agricultural manufacturing has declined, owing primarily to losses in the production of non-food commodities, farming structures and methods, and agricultural product advertising. Precision farming, also known as digital agriculture, has arisen as a new medical specialisation that employs fact-based tactics to boost agricultural productivity while reducing environmental impacts in order to address the issue of agri-generation.

LITERATURE SURVEY

Farmers may assess the quantity of their farm's output, as well as the ambient temperature and moisture levels, as well as the moisture and water content of the soil, on their own. The key advantage is that the structure's mobility can be adjusted depending on the scenario (flora, weather, soil, and a lot of others).

We supported a version of a real-time tracking device for soil properties such as moisture, temperature, and pH by accumulating real-time information on agricultural productivity. For this aim, Ubi-Sense motes are placed, and decision support machines are employed to monitor crops.

SMS messages, as well as guidance regarding a climatic sample, can be delivered to the farmer. The Remote Monitoring System is opulent in smaller areas, and specialist expertise is required to assess the image.

They created a gadget that performs the intended sports while gathering environmental data such as humidity, temperature, soil moisture, and wind speed using IoT nodes placed in the field. The GSM module built inside Arduino is used to update the current weather and environmental conditions as well as receive data from the device.

The proposed study makes advantage of the benefits of IoT at nearly every stage of crop production, including seeding, growing, harvesting, watering, and transportation. Farmers and other stakeholders interested in obtaining comprehensive crop information, from yield output to sales, can profit from real-time sensor statistics collected in these types of agricultural ranges by equipment equipped with Radio Frequency Identification Systems and other sensors.

PROPOSED SYSTEM METHODOLOGIES

The resulting semantic records provide yield prediction information based primarily on environmental factors, growing plant diseases, and preventive measures

leveraging cloud inference and other types of information. In some cases, our strategy outperforms current strategies. While predicting vegetation, the machine aims to aid farmers in making sound decisions. The primary elements of the suggested device are as follows: Automatic temperature, humidity, tree, and water tracking; ,Internet-based data transmission to a server via a Wi-Fi module; , Peer-to-peer and multipoint community implementation by configuring each module to work as a sensing node.

Old temperature and humidity records from the government website are also obtained and saved in order to improve the accuracy of the statistics supplied. Historical rainfall records are also compiled and saved. The accuracy achieved via the application of special system learning approaches is compared to achieving the most correct outcome, which is subsequently delivered to the stop user. The machine recommends the ideal crop to grow as well as the fertiliser to go with it.

WORKING

The temperature sensors are set at a specified height above the ground, whilst the moisture sensors are distributed at specific areas of the sector and rains.

The moisture sensor measures the moisture content of the soil. The temperature sensor

determines the temperature. As soon as the motor is turned on, the device checks its operation. The farmer receives a message that says "the farm needs water, but the engine isn't constantly working," and the comparable message is displayed on the LCD. If water is the problem within the motor, it will check for moisture levels. If the moisture content of the selected soil interior challenge is less than 31.5, Arduino receives alerts from the moisture sensors and activates the motor through a relay. The farmer receives a message from the GSM module in addition to the overall sensor data and the message "motor is turned ON." If the soil is moist after proper irrigation, i.e., all sensor values are above the edge stage, the Arduino disables the motor via the relay. The farmer receives the notification "motor turned on due to high temperature" via the GSM module, which is shown on the LCD and audible through the buzzer earphones at the same time. This GSM modem is used to send and receive information from the farmer. The GSM modem works exactly like a cell phone. A SIM card is used to send and receive the farmer's statistics. Another critical component is the WI-FI module, which is used to upload the recorded values to the web server. The expenses of one moisture sensor, one raindrop sensor, and one temperature

sensor will be continuously updated on a web server using a Wi-Fi module for similar information evaluation and sensor monitoring.

RESULTS AND DISCUSSION

The primary goal of our study is to adapt new technologies to critical industries such as agriculture. the use of IoT technology in agriculture This system simplifies agriculture. Water and energy conservation are extremely critical in today's agricultural climate. As a result of the usage of sensor networks in agricultural fields, smart irrigation is now conceivable. The cloud was employed to provide IoT data to the buyer. As a result, any changes in the crop may be clearly recognised and assessed early. Farmers in particular might profit immensely from the suggested smart agricultural tracking. After receiving data from the microcontroller, the GSM modem forwards the messages to the proper touch numbers. The Wi-Fi model then sends the parameters to the IoT server via a graphical approach. The farmer then takes the essential field safety precautions.

CONCLUSION

We propose a cutting-edge strategy for smart agriculture that makes use of the Internet of Things and machine learning in this article. The incorporation of both

historical and ancient data improves the final product's accuracy. The equipment also gives farmers with quick and accurate solutions. As the world's population grows and extreme climate events like droughts, warm waves, and huge storms become more common or severe due to climate change, agricultural output forecasting will become more important for guaranteeing food security. To estimate agricultural production, area surveys, crop trends, remote sensing, traditional statistical models, and, more recently, device learning algorithms have all been used.

FUTURE SCOPE

To develop the system even further, the following characteristics can be added: the use of soil moisture sensors, ambient sensors, and pH sensors to improve accuracy even when predicting the crop. Locations, market demands, and the crops of adjacent farmers may all be considered when recommending the best crop. This low-cost system was inspired by the Internet of Things, which allows for global research and discovery of hardware-based agricultural criticism. For example, the hybrid software, which is compatible with Android, iOS, and internet platforms, enables the farmer to monitor sensor data from anywhere in the world.

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A NOVEL METHOD FOR HANDWRITTEN DIGIT RECOGNITION

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Abstract- With the increase of Artificial Neural Network (ANN), deep learning has brought a dramatic twist in the field of machine learning by making it more artificially intelligent. Deep learning is remarkably used in vast ranges of fields because of its diverse range of applications such as surveillance, health, medicine, sports, robotics, drones, etc. In deep learning, Convolutional Neural Network (CNN) is at the center of spectacular advances that mixes Artificial Neural Network (ANN) and up to date deep learning strategies. It has been used broadly in pattern recognition, sentence classification, speech recognition, face recognition, text categorization, document analysis, scene, and handwritten digit recognition. The goal of this paper is to observe the variation of accuracies of CNN to classify handwritten digits using various numbers of hidden layers and epochs and to make the comparison between the accuracies. For this performance evaluation of CNN, we performed our experiment using Modified National Institute of Standards and Technology (MNIST) dataset. Further, the network is trained using stochastic gradient descent and the backpropagation algorithm.

Keywords: Handwritten digit recognition,Deep learning, MNIST dataset,Backpropagation algorithm.

I. INTRODUCTION

In deep learning, Convolutional Neural Networking (CNN) is being used for visual imagery analyzing. Object detection, face recognition, robotics, video analysis, segmentation, pattern recognition, natural language processing, spam detection, topic categorization, regression analysis, speech recognition, image classification are some of the examples that can be done using Convolutional Neural Networking. The accuracies in these fields including handwritten digits recognition using Deep Convolutional Neural Networks (CNNs) have reached human level perfection. Mammalian visual systems' biological model is the one by which the architecture of the CNN is inspired. Cells in the cat's visual cortex are sensitized to a tiny area of the visual field identified which is recognized as the receptive field. It was found by D. H. Hubel et al. in 1062.

The neocognitron, the pattern recognition model inspired by the work of D.H. Hubel et al.was the first computer vision. It was introduced by Fukushima in 1980. In 1998, the frameworkof CNNs is designed by LeCun et al. which had seven layers of convolutional neural networks. It was adept in handwritten digits classification direct from pixel values of images. Gradient descent and back propagation algorithm is used for training the model. In handwritten recognition digits, characters are given as input. The model can be recognized by the system. A simple artificial neural network (ANN) has an input layer, an output layer and some hidden layers between the input and output layer. CNN has a very similar architecture as ANN.

There are several neurons in each layer in ANN. The weighted sum of all the neurons of a layer becomes the input of a neuron of the next layer adding a biased value. In CNN the layer has three dimensions. Here all the neurons are not fully connected. Instead, every neuron in the layer is connected to the local receptive field. A cost function generates in order to train the network. It compares the output of the network with the desired output. The signal propagates back to the system, again and again, to update the shared weights and biases in all the receptive fields to minimize the value of cost function which increases the network's performance. The goal of this article is to observe the influence of hidden layers of a CNN for handwritten digits. We have applied a different type of Convolutional Neural Network algorithm on Modified National Institute of Standards and Technology (MNIST) dataset using Tensorflow, a Neural Network library written in python. The main purpose of this paper is to analyze the variation of outcome results for using a different combination of hidden layers of Convolutional Neural Network.

II. LITERATURE REVIEW

Convolution neural network(CNN) is playing an essential role in many sectors like image processing. CNN is also used for fault detection and classification. Handwritten digit recognition has become an issue of interest among researchers. There are a large number of papers and articles are being published these days about this topic. In research, it is shown that Deep Learning algorithm like multilayer CNN using Keras with Theano and Tensorflow gives the highest accuracy in comparison with the most widely used machine learning algorithms like SVM, KNN & RFC. Because of its highest accuracy, Convolutional Neural Network (CNN) is being used on a large scale in image classification, video analysis, etc. Many researchers are trying to make sentiment recognition in a sentence.CNN is being used in natural language processing and sentiment recognition by varying different parameters. It is pretty challenging to get a good performance as more parameters are needed for the large-scale neural network. Many researchers are trying to increase the accuracy with less error in CNN. In another research, they have shown that deep nets perform better when they are trained by simple back-propagation. Their architecture results in the lowest error rate on MNIST compare to NORB and CIFAR10. Researchers are working on this issue to reduce the error rate as much as possible in handwriting recognition. In one research, an error rate of 1.19% is achieved using 3-NN trained and tested on MNIST. Deep CNN can be adjustable with the input image noise. Coherence recurrent convolutional network (CRCN) is a multimodal neural architecture. It is being used in recovering sentences in an image. Some researchers are trying to come up with new techniques to avoid drawbacks of traditional convolutional layer's. Ncfm (No combination of feature maps) is a technique which can be applied for better performance using MNIST datasets. Its accuracy is 99.81% and it can be applied for large- scale data. New applications of CNN are developing day by day with many kinds of research. Researchers are trying hard to minimize error rates. Using MNIST datasets and CIFAR, error rates are being observed. To clean blur images CNN is being used. For this purpose, a new model was proposed using MNIST dataset. This approach reaches an accuracy of 98% and loss range 0.1% to 8.5%. In Germany, a traffic sign recognition model of CNN is suggested. It proposed a faster performance with 99.65% accuracy. Loss function was designed, which is applicable for light-weighted 1D and 2D CNN. In this case, the accuracies were 93% and 91% respectively.

III.   MODELING OF CONVOLUTION NEURAL NETWORK TO CLASSIFY HANDWRITTEN DIGITS

Fig. 1.

A seven-layered convolutional neural network for digit recognition

To recognize the handwritten digits, a seven-layered convolutional neural network with one input layer followed by five hidden layers and one output layer is designed and illustrated in figure 1.

The input layer consists of 28 by 28 pixel images which mean that the network contains 784 neurons as input data. The input pixels are grayscale with a value 0 for a white pixel and 1 for a black pixel. Here, this model of CNN has five hidden layers. The first hidden layer is the convolution layer 1 which is responsible for feature extraction from an input data. This layer performs convolution operation to small localized areas by convolving a filter with the previous layer. In addition, it consists of multiple feature maps with learnable kernels and rectified linear units (ReLU). The kernel size determines the locality of the filters. ReLU is used as an activation function at the end of each convolution layer as well as a fully connected layer to enhance the performance of the model. The next hidden layer is the pooling layer 1.It reduces the output information from the convolution layer and reduces the number of parameters and computational complexity of the model. The different types of pooling are max pooling, min pooling, average pooling, and L2 pooling. Here, max pooling is used to subsample the dimension of each feature map. Convolution layer 2 and pooling layer 2 which has the same function as convolution layer 1 and pooling layer 1 and operates in the same way except for their feature maps and kernel size varies. A Flatten layer is used after the pooling layer which converts the 2D featured map matrix to a 1D feature vector and allows the output to get handled by the fully connected layers. A fully connected layer is another hidden layer also known as the dense layer. It is similar to the hidden layer of Artificial Neural Networks (ANNs) but here it is fully connected and connects every neuron from the previous layer to the next layer. In order to reduce overfitting, dropout regularization method is used at fully connected layer 1. It randomly switches off some neurons during training to improve the performance of the network by making it more robust. This causes the network to become capable of better generalization and less compelling to overfit the training data. The output layer of the network consists of ten neurons and determines the digits numbered from 0 to 9. Since the output layer uses an activation function such as softmax, which is used to enhance the performance of the model, classifies the output digit from 0 through 9 which has the highest activation value.

The MNIST handwritten digits database is used for the experiment. Out of 70,000 scanned images of handwritten digits from the MNIST database, 60,000 scanned images of digits are used for training the network and 10,000 scanned images of digits are used to test the network. The images that are used for training and testing the network all are the grayscale image with a size of 28×28 pixels. Character x is used to represent a training input where x is a 784-dimensional vector as the input of x is regarded as 28×28 pixels. The equivalent desired output is expressed by y(x), where y is a 10dimensional vector. The network aims is to find the convenient weights and biases so that the output of the network approximates y(x) for all training inputs x as it completely depends on weight values and bias values. To compute the network performances, a cost function is defined, expressed by equation 1.
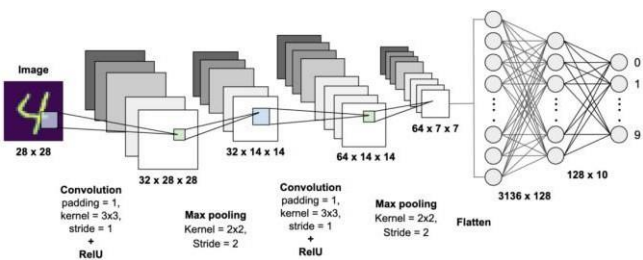
$$C(w,b)=(1/2nx)\sum \|y(x) - a\|^2 \qquad (1)$$

Where w is the cumulation of weights in the network, b is all the biases, n is the total number of training inputs and a is the actual output. The actual output a depends on x, w, and b. C(w,b) is non-negative as all the terms in the sum is non- negative. Moreover, C(w,b)=0, precisely when desired output y(x) is comparatively equal to the actual output, a, for all training inputs, n. To reduce the cost C(w,b) to a smaller degree as a function of weight and biases, the training algorithm has to find a set of weight and biases which cause the cost to become as small as possible. This is done using an algorithm known as gradient descent. In other words, gradient descent is an optimization algorithm that twists its parameters iteratively to minimize a cost function to its local minimum. The gradient descent algorithm deploys the following equations [25] to set the weight and biases.
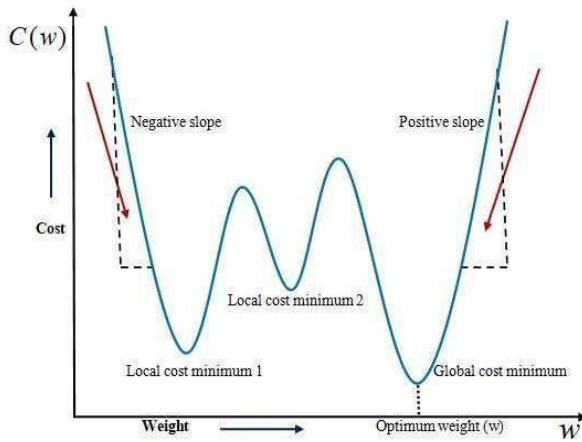
Fig. 2. Graphical Representation of Cost vs. Weight

$$w_{new} = w_{old} - \eta \frac{\partial C}{\partial w_{old}} \quad (2)$$

$$b_{new} = b_{old} - \eta \frac{\partial C}{\partial b_{old}} \quad (3)$$

And to attain the global minimum of the cost C(w,b) shown in figure 2.

The output of the network can be expressed by:

$$a = f(z) = f(wa + b)$$

IV. MNIST DATASET

Modified National Institute of Standards and Technology (MNIST) is a large set of computer vision dataset which is extensively used for training and testing different systems. It was created from the two special datasets of National Institute of Standards and Technology (NIST) which holds binary images of handwritten digits. The training set contains handwritten digits from 250 people, among them 50% training datasets was employees from the census bureau and the rest of it was from high school students. However, it is often attributed as the first datasets among other datasets to prove the effectiveness of the neural networks.
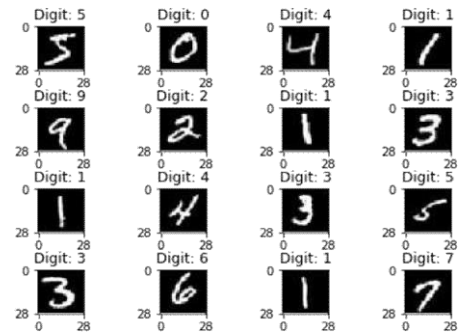
Fig. 3. Sample images of MNIST handwritten digit dataset

The database contains 60,000 images used for training as well as few of them can be used for cross-validation purposes and 10,000 images used for testing [27]. All the digits are grayscale and positioned in a fixed size where the intensity lies at the center of the image with 28×28 pixels. Since all the images are 28×28 pixels, it forms an array which can be flattened into 28*28=784 dimensional vector. Each component of the vector is a binary value which describes the intensity of the pixel.

V. RESULTS

. A. Discussion of the Obtained Simulated Results   In this section, CNN has been applied on the MNIST dataset in order to observe the variation of accuracies for handwritten digits. The accuracies are obtained using Tensorflow in python. Training and validation accuracy for 15 different epochs were observed exchanging the hidden layers for various combinations of convolution and hidden layers by taking the batch size 100 for all the cases. Figure 4,5, 6, 7, 8, and 9 shows the performance of CNN for different combinations of convolution and hidden layers. Table 1 shows the minimum and maximum training and validation accuracies of CNN found after the simulation for the six different cases by varying number of hidden layers for the recognition of handwritten digits.

In the first case shown in figure 4, the first hidden layer is the convolutional layer 1 which is used for the feature extraction. It consists of 32 filters with the kernel size of 3×3 pixels and the rectified linear units (ReLU) is used as an activation function to enhance the performance. The next hidden layer is the convolutional layer 2 consists of 64 filters with a kernel size of 3×3 pixels and ReLU. Next, a pooling layer 1 is defined where max pooling is used with a pool size of 2×2 pixels to minimize the spatial size of the output of a convolution layer. A regularization layer dropout is used next to the pooling layer 1 where it randomly eliminates 25% of the neurons in the layer to reduce overfitting. A flatten layer is used after the dropout which converts the 2D filter matrix into 1D feature vector before entering into the fully connected layers. The next hidden layer used after the flatten layer is the fully connected layer 1 consists of 128 neurons and ReLU. A dropout with a probability of 50% is used after the fully connected layer 1. Finally, the output layer which is used here as fully connected layer 2 contains 10 neurons for 10 classes and determines the digits numbered from 0 to 9.
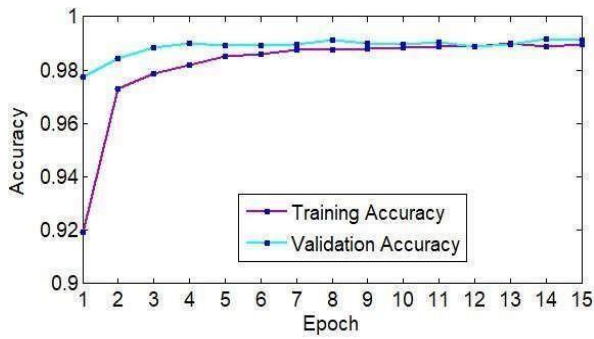
Fig. 4. Observed accuracy for case 1

Figure 5 is defined for case 2, where convolution 1, pooling 1 and convolution 2, pooling 2 is used one after another. A dropout is used followed by the flatten layer and fully connected layer 1. Before the fully connected layer 2 another dropout is used. The dimensions and parameters used here and for the next cases are same which are used earlier for case 1. The overall validation accuracy in the performance is found 99.21%. At epoch 1 the minimum training and validation accuracy are found. The minimum training accuracy is 90.11% and the minimum validation accuracy is 97.74%. The maximum training and validation accuracy are found at epoch 14. The maximum training and validation accuracies are 98.94% and 99.24%. The total test loss is found approximately 0.026303.

For case 3, shown in figure 6, where two convolutions are taken one after another followed by a pooling layer. After the pooling layer, a flatten layer is used followed by the two fully connected layers without any dropout. The overall validation accuracy in the performance is found 99.06%. The minimum
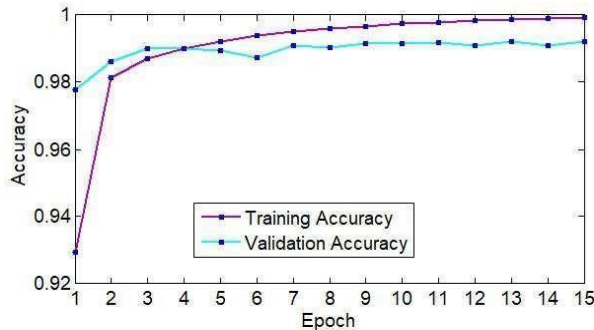
Fig. 5. Observed accuracy for case 2

training accuracy is found 94.35% at epoch 1 and epoch 3, the minimum validation accuracy is found 98.33%. The maximum training and validation accuracies are 1% and 99.06% found at epoch 15. The total test loss is found approximately 0.049449.

Similarly, in case 4 shown in figure 7, convolution 1, pooling 1 and convolution 2, pooling 2 are used alternately

Fig. 6. Observed accuracy for case 3

followed by a flatten layer and two fully connected layers without any dropout. The overall validation accuracy in the performance is found 99.20%. At epoch 1 the minimum training and validation accuracy are found.

The minimum training accuracy is 92.94% and the minimum validation accuracy is 97.79%. The maximum training accuracy is found 99.92% at epoch 15 and epoch 13, the maximum validation accuracy also found 99.92%. The total test loss is found approximately 0.032287.
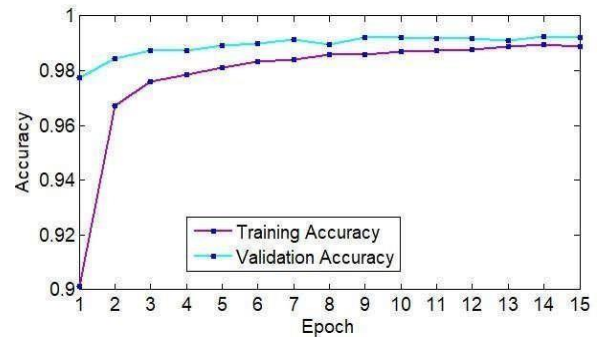
Fig. 7. Observed accuracy for case 4

Again, for case 5 shown in figure 8, two convolutions are used one after another followed by a pooling layer, flatten layer and fully connected layer 1. A dropout is used before the fully
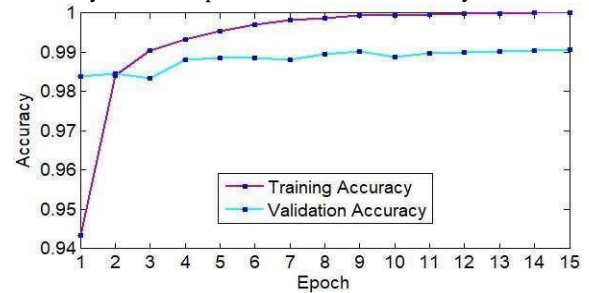
Fig. 8. Observed accuracy for case 5

connected layer 2. The overall validation accuracy in the performance is found 99.09%. The minimum training and validation accuracy are found at epoch 1. The minimum training accuracy is 91.80% and the minimum validation accuracy is

98.16%. At epoch 13, the maximum training accuracy is found 99.09% and the maximum validation accuracy is found 99.12% at epoch 12. The total test loss is found approximately 0.034337.

Finally, for case 6 shown in figure 9, convolution 1, pooling 1 and convolution 2, pooling 2 are used alternately followed by a flatten layer and fully connected layer 1. A dropout is used before the fully connected layer 2. The overall validation accuracy in the performance is found 99.07%. At epoch 1 the minimum training and validation
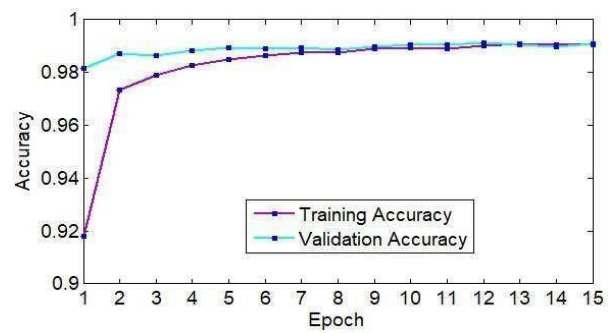
accuracy are found. The minimum training accuracy is 90.5% and the minimum validation accuracy is 97.13%. The maximum training accuracy is found 99.24% at epoch 15 and the maximum validation accuracy is found 99.26% at epoch 13. The total test loss is found approximately 0.028596.

A. Comparison with Existing Research Work

There are several methods of digit recognition. The handwritten digit recognition can be improved using some widely held methods of the neural network like Deep Neural Network (DNN), Deep Belief Network (DBF) and

Convolutional Neural Network (CNN), etc.

Tavanaei et al. proposed multi-layered unsupervised learning in a spiking CNN model where they used MNIST dataset to clear the blur images and found the overall accuracy of 98% and the range of performance loss was 0.1% to 8.5% [20]. Rezoana et al. [28] proposed a seven- layered Convolutional Neural Network for the purpose of handwritten digit recognition where they used MNIST dataset to evaluate the impact of the pattern of the hidden layers of CNN over the performance of the overall network. They have plotted the loss curves against the number of epochs and found that the performance loss was below 0.1 for most of the cases and sometimes, in some cases, the loss was less than 0.05. In another paper, Siddique et al. [29] proposed an L-layered feedforward neural network for the handwritten digit recognition where they have applied neural network with different layers on the MNIST dataset to observe the variation of accuracies of ANN for different combinations of hidden layers and epochs.

Their maximum accuracy in the performance was found
 97.32% for 4 hiddenlayers at 50 epochs.

Comparing with their above performances based on MNIST dataset for the purpose of digit recognition we have achieved better performance for the CNN. In our experiment, we have found the maximum training accuracy 100% and maximum validation accuracy 99.92% both at epoch 15. The overall performance of the network is found 99.21%. Moreover, the overall loss ranged from 0.026303 to 0.049449. Hence, this proposed method of CNN is more efficient than the other existing method for digit recognition.

I.   CONCLUSION

In this paper, the variations of accuracies for handwritten digit were observed for 15 epochs by varying the hidden layers. The accuracy curves were generated for the six cases for the different parameter using CNN MNIST digit dataset.

The six cases perform differently because of the various combinations of hidden layers. The layers were taken randomly in a periodic sequence so that each case behaves differently during the

experiment. The maximum and minimum accuracies were observed for different hidden layers variation with a batch size of 100. Among all the observation, the maximum accuracy in the performance was found 99.21% for 15 epochs in case 2 (Conv1, pool1, Conv2, pool2 with 2 dropouts). In digit recognition, this type of higher accuracy will cooperate to speed
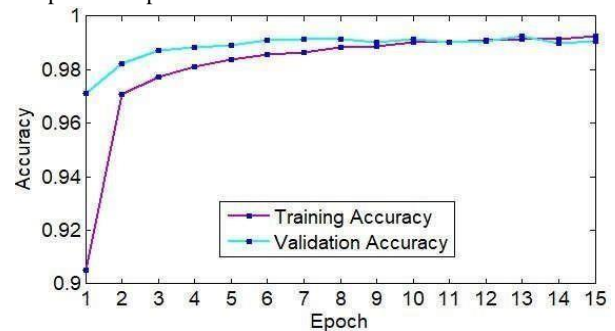
Fig. 9. Observed accuracy for case 6

up the performance of the machine more adequately. However, the minimum accuracy among all observation in the performance was found 97.07% in case 6 (Conv1, pool1, Conv2, pool2 with 1 dropout). Moreover, among all the cases, the total highest test loss is approximately 0.049449 found in case 3

without dropout and the total lowest test loss is approximately 0.026303 found in case 2 with dropout. This low loss will provide CNN better performance to attain better image resolution and noise processing. In the future, we plan to observe the variation in the overall classification accuracy by varying the number of hidden layers and batch size.

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A Study on Classification of Algorithms in Machine Learning

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Abstract - Machine gaining knowledge of (ML) is the medical observe of algorithms and statistical models that pc structures use to perform a unique venture without being explicitly programmed. Learning algorithms in many packages that's we make use of every day. Every time a web search engine like Google is used to search the internet, one of the reasons that work so well is because a getting to know algorithm that has found out how to rank web pages. These algorithms are used for diverse functions like facts mining, photo processing, predictive analytics, and so forth, to name some. The principal advantage of the use of machine learning is that, as soon as a set of rules learns what to do with data, it can do its work automatically. In this paper, a quick overview and destiny prospect of the tremendous applications of device mastering algorithms has been made.

INTRODUCTION

Since their evolution, people have been using many types of equipment to perform numerous responsibilities in a simpler way. The creativity of the human mind led to the discovery of different machines. These machines made the human existence clean with the aid of allowing humans to satisfy diverse existence desires, such as traveling, industries, and computing. And Machine learning is the one among them. According to Arthur Samuel Machine gaining knowledge of is described as the sector of take a look at that offers computers the capability to learn without being explicitly programmed. Arthur Samuel became famous for his checkers playing program. Machine getting to know Machine Learning is used to teach machines how to handle the records greater successfully. Sometimes after viewing the information, we cannot interpret the extract data from the statistics. In that case, we observe device learning. With the abundance of datasets available, the demand for gadget gaining knowledge of is in upward thrust. Many industries apply device learning to extract applicable information. The cause of gadget learning is to learn from the records. Many studies were completed on the way to make machines research by themselves without being explicitly programmed.

Many mathematicians and programmers follow numerous procedures to discover the answer of this hassle

which are having large records sets. Machine Learning is based on one-of-a-kind algorithms to remedy records issues. Data scientists like to factor out that there's no one-length-fits-all type of algorithm that is fine to clear up a hassle. The form of set of rules hired relies upon on the type of trouble you want to clear up, the quantity of variables, the sort of model that could healthy it fine and so on.
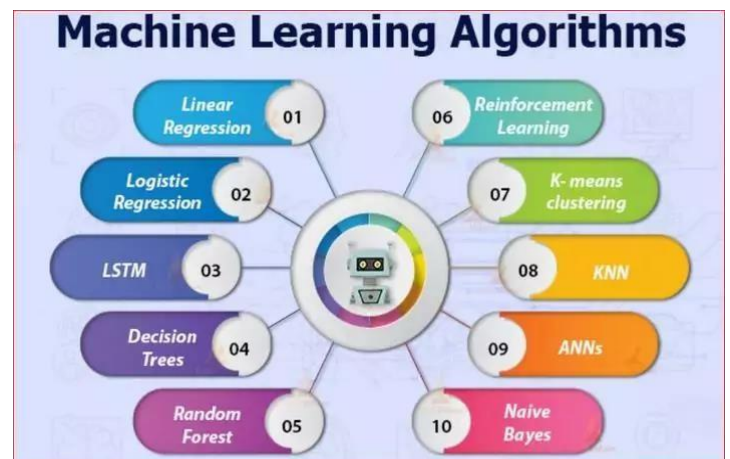
Figure 1: Support Vector Machine

Here's a short look at a number of the generally used algorithms in machine learning (ML).

There are mainly 3 types of algorithms in ML:
Supervised Learning Algorithms
Unsupervised Learning Algorithms
Reinforcement Learning algorithms

Supervised Learning

Supervised studying is the device studying assignment of gaining knowledge of a function that maps an input to an output based totally on instance input-output pairs. It infers a characteristic from labelled schooling records which include a fixed of training examples. The supervised device getting to know algorithms are those algorithms which needs external assistance. The input dataset is divided into train and check dataset. The train dataset has output variable which wishes to be expected or classified. All algorithms analyze some kind of patterns from the training dataset and practice them to the take a look at dataset for prediction or category.
Supervised learning can be further divided into two types of problems:

Regression
Regression algorithms are used if there's a relationship among the enter variable and the output variable. It is used for the prediction of non-stop variables, including Weather forecasting, Market Trends, etc. Below are some popular Regression algorithms which come under supervised studying:
Linear Regression
Polynomial Regression

Support Vector Regression
Decision tree Regression

Linear Regression
It is one of the most-used regression algorithms in Machine Learning. A huge variable from the statistics set is chosen to is expecting the output variables (destiny values). Linear regression set of rules is used if the labels are continuous, like the range of flights each day from an airport, and so on. The illustration of linear regression is y = b*x + c. In the above illustration, 'y' is the impartial variable, whereas 'x' is the dependent variable. When you plot the linear regression, then the slope of the line that gives us the output variables is termed 'b', and 'c' is its intercept. The linear regression algorithms anticipate that there is a linear courting among the entered and the output. If the based and unbiased variables are not plotted on the equal line in linear regression, then there will be a loss in output. The loss in output in linear regression can be calculated as: Loss feature: (Predicted output
– actual output)

Polynomial Regression
It is used for curvilinear information. Polynomial regression is in shape with the approach of least squares. The goal of regression analysis is to model the predicted fee of a dependent variable y in regards to the impartial variable x. The equation for polynomial regression is:
$$f(x) = c_0 + c_1 x + c_2 x^2 \cdots c_n x^n.$$

Support Vector Regression
Support Vector Machine is a supervised learning algorithm which can be used for regression as well as classification problems. So if we use it for regression problems, then it is termed as Support Vector Regression. In SVR, we constantly try to decide a hyperplane with a most margin, so that most variety of datapoints are included in that margin. The fundamental goal of SVR is to recollect the most datapoints within the boundary traces and the hyperplane (best-fit line) should comprise a most range of datapoints. Consider the under photo:
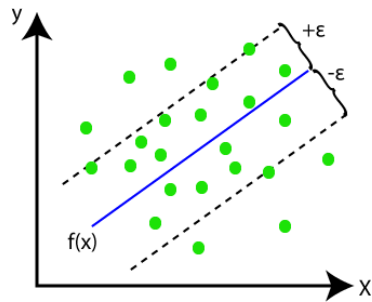
Figure 2: Support Vector Machine

Decision Tree Regression

Decision Tree is a supervised getting to know set of rules which may be used for solving each category and regression problems.It can clear up problems for both express and numerical statistics. Decision Tree regression builds a tree-like structure wherein each inner node represents the "check" for an attribute, each branch constitute the result of the check, and each leafnode represents the final decision or end result.A decision tree is constructed starting from the rootnode/discern node (dataset), which splits into left and proper baby nodes (subsets of dataset). These toddler nodes are further divided into their children node, and themselves turn out to be the figure node of those nodes.

Classification
Classification algorithms are used while the output variable is specific, which means that there are two lessons which include Yes-No, Male-Female, True- false, etc.
Random Forest
Decision Trees
Logistic Regression
KNN

Random Forest
Random Forest is a popular gadget gaining knowledge of algorithm that belongs to the supervised studying technique. It may be used for each Classification and Regression problems in ML. It is based on the idea of ensemble gaining knowledge of, that's a method of mixing a couple of classifiers to clear up a complicated problem and to enhance the overall performance of the version. As the call shows, "Random Forest is a classifier that incorporates a number of choice trees on numerous subsets of the

given dataset and takes the common to improve the predictive accuracy of that dataset." Instead of relying on one choice tree, the random wooded area takes the prediction from each tree and based on most people votes of predictions, and it predicts the final output. The more number of bushes within the wooded area ends in better accuracy and prevents the trouble of overfitting.

Decision tree
Decision tree is a graph to represent selections and their effects in form of a tree. The nodes inside the graph constitute an occasion or desire and the rims of the graph represent the decision policies or situations. Each tree consists of nodes and branches. Each node represents attributes in a group that is to be labelled and each department represents a price that the node can take.
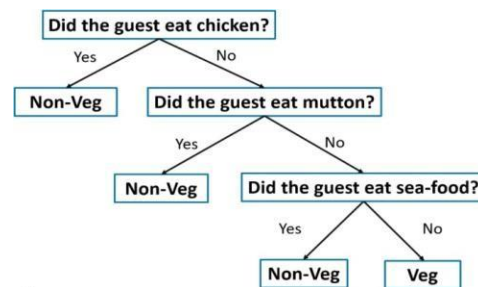
Figure 3: Decision Tree

Logistic Regression
Logistic regression is a calculation used to predict a binary outcome: both some thing takes place, or does not. This may be exhibited as Yes/No, Pass/Fail, Alive/Dead, and so on. Independent variables are analysed to decide the binary outcome with the outcomes falling into one among classes. The independent variables can be categorical or numeric, but the dependent variable is always categorical. Written like this:

P(Y=1|X) or P(Y=0|X)

It calculates the probability of dependent variable *Y*, given independent variable *X*.

K-nearest Neighbors
K-nearest buddies (ok-NN) is a pattern recognition algorithm that makes use of training datasets to find the ok closest loved ones in destiny examples. When k-NN is utilized in category, you calculate to location records in the class of its nearest neighbor. If ok = 1, then it'd be placed in the magnificence

nearest 1. K is assessed through a plurality poll of itspals.

Unsupervised Learning Algorithm
It is a type of device gaining knowledge of wherein the device does not want any external supervision to examine from the records, for this reason called unsupervised getting to know. The unsupervised fashions can be skilled the usage of the unlabelled dataset that is not classified, nor classified, and the algorithm wishes to act on that records without any supervision. In unsupervised learning, the model doesn't have a predefined output, and it tries to find useful insights from the massive amount of facts. These are used to resolve the Association and Clustering troubles. Hence similarly, it is able to be classified into two types: Clustering, Association.
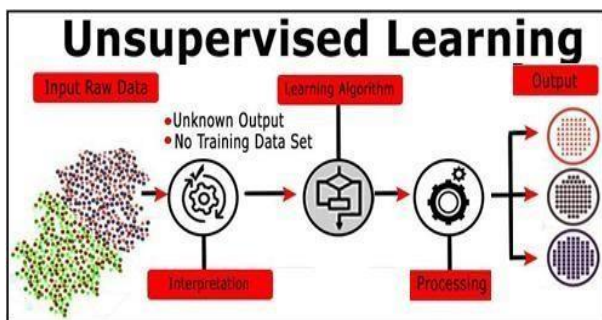
Figure 4: Unsupervised Learning

Clustering:
Clustering is a technique of grouping the items into clusters such that objects with most similarities stays into a set and has less or no similarities with the items of some other organization. Cluster analysis finds the commonalities between the records items and categorizes them as consistent with the presence and absence of these commonalities.

Association:
An affiliation rule is an unmonitored gaining knowledge of approach that's used for locating the relationships between variables in the huge database. It determines the set of items that occurs collectively in the dataset. Association rule makes advertising and marketing strategy greater effective. Such as individuals who purchase X object (suppose a bread) are also generally tend to purchase Y (Butter/Jam) item. A common example of Association rule is Market Basket Analysis.

Reinforcement Learning

In Reinforcement mastering, an agent interacts with its environment by way of producing actions, and examine with the help of feedback. The feedback is given to the agent inside the form of rewards, inclusive of for each desirable action, he gets a positive reward, and for each terrible motion, he gets a terrible praise. There is not any supervision supplied to the agent. Q-Learning algorithm is utilized in reinforcement mastering.
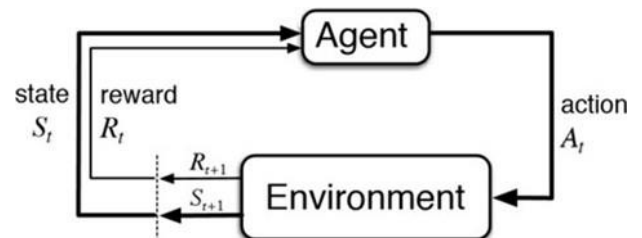
Figure 5: Reinforcement Learning

Conclusion

Machine Learning may be a Supervised or Unsupervised. If you have lesser amount of facts and in reality labelled facts for schooling, choose Supervised Learning. Unsupervised Learning could commonly supply better overall performance and results for massive records units.

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AgriBot(Ag-Sense)

Using Artificial Intelligence, Machine Learning and Internet of Things (IoT)

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Abstract - *The Indian subcontinent is known for its agricultural wealth all over the world. The agriculture and its practices have a major role in Indian history. In all these years, Indian farmers has been using traditional ways of agriculture. As a result, we failed to modernize and implement scientific technologies in the field of agriculture. It is known that in recent times, some technologies are being implemented in the agricultural field. But still these technologies are not available for all level of farmers. Now, our team has developed a wonderful Rover called AG-Sense that will lift the agriculture to its next level. It replaces all the traditional ways of farming like sowing, weed removal, soil nature test etc., with its intelligent AI technology and its aesthetic design.*

1. INTRODUCTION

Agriculture is rapidly becoming a high-tech industry, attracting new professionals, new companies and new investors. Technology is quickly advancing, not only in improving farmers' productive skills but also in developing robotic and automated technologies as we know them. At the heart of this trend is the need to be more productive. And with the growing population, the world will need more food, and farmers will face greater pressure to comply. Agricultural robots increase productivity for farmers in a variety of ways. From drones to independent tractors to the arms of a robot, technology is used in creative and innovative systems. Agricultural robots perform slow, repetitive and dull tasks for farmers, allowing them to focus more on improving overall productivity.

We use the concept of Artificial Intelligence technology in agriculture. In AI Robotics, many robots collectively solve problems by building beneficial structures and behaviors similar to those seen in natural systems. Machines technically co-operate without central control, and act in accordance with environment . Only their interactions emerge in a way that can solve complex tasks. These factors lead to the main advantages: flexibility, durability, and durability. With the implementation of AI along with robotics, many robots - homogeneous or heterogeneous - are connected and are allowed to perform the aim of action in the environment. Since robots have the ability to process, communicate and hear in an environment where on board they are able to communicate with others, and respond to the environment independently. In recent times, agricultural growth has slowed down day by day largely due to staff shortages.

Although the lack of rainfall, the failure of the weather, the long summers and the effect of extreme heat contribute to the destruction of agricultural growth, a shortage of workers is a major reason for slowing down agricultural growth. To overcome this shortage of workers in the agricultural sector and the challenges facing Indian farmers, it led

us to work on innovation "Ag-Sense - the AgriBot" to reduce this problem. It can use power sources efficiently and communicate via Wi-Fi. And is capable of monitoring over the entire field of cultivation throughout day and night. This multi-purpose program provides a breakthrough method for sowing, cultivating, irrigating and cutting crops with minimal human effort and performance that makes it an efficient machine. The machine will plough the farm by looking at certain rows and certain columns at a certain distance depending on the yield. In this method, it would have sufficient intelligence embedded within to behave well orderly for a long time, on its own, in a semi-natural environment, while carrying out a useful task. The whole design is automated with the help of a Wi-Fi module and signals done through the Groaq application over a phone. The whole process of calculation, processing, monitoring is built with motors & sensor connected to the microcontroller and all the analysis and the working is manipulated and monitored via the AI that is working beyond .

2. PROPOSED METHODOLOGY

The basic aim of this paper is to develop a multipurpose machine that will be able to plough the land, sow the seeds, water the crops, level the land and carry out harvesting. This whole system of the robot works with the battery and over Wi-Fi communication. We will be using an android smart phone application i.e., Groaq app to control the vehicle to respond to the control signal. The proposed system of the project consists of a Rover with shapeshifting alloy wheels which increases the mobility of the rover and allows the rover to run in various surfaces of the field. The rover is implemented with a various range of sensors that help in detecting the parameters of the soil condition. The sensors help in collecting the data about the soil conditions and helps in selection of right crops for the field. The rover has a camera vision with a 3600 view which detects the path of the rover and helps in the selection of right crops for maintenance. The rover has a seed chamber which stores the seed and sows the seed with the help of seed dispenser.   The rover has steel extensions at one of its ends that helps for ploughing the field. The plough is designed at such a way that it ploughs the land so good. The rover also has a weed-

removing hand at both its sides that detects the weeds it's camera vision system and removes the weed effectively.

As mentioned, the rover has 2 types of sensors (i.e) Tensiometric sensor and Electrochemical sensor placed at both the sides of the rover. The Tensiometric sensor helps in detecting the moisture level of the soil and sends the data to the system. The system interprets the data given by the sensor and supplies the water to the crop using the sprinkler system which is integrated to the rover. Another type of sensor (i.e) the Electrochemical sensor which helps in detecting the mineral level of the soil which in turn helps in the supply of right number of resources to the plant.

The proposed project work consists of 3 stages such as Training the AI Module, Creating a Raspberry Module for the Rover, Interfacing the camera and sensors with software. The Module description is as follows.

Module 1: Developing the code in python The Developing of Python code is done through Integrated development Learning Environment (IDLE) python software as machine learning uses python or R Language for processing data. The Python version is 3.9. Along with this other framework languages of python like Matplotlib, Tableau etc.

Module 2: Creating a Raspberry Pi module for the functions of the Rover For all the mechanisms carried out by the Rover, Raspberry module is been created for all the process mentioned above. It is then integrated with the PC board along with all the hardware involved in the mechanisms.

Module 3: Interfacing the camera and all the sensors with Raspberry Pi module After developing the code, the camera and sensors must be integrated into the software and fix it such that it monitors the field and the sensor operations

Module 4: Integrating the Raspberry Pi with the application software After the integration of camera and sensors with the Raspberry Pi module, the module is integrated with the application software through which the supplied data can be interpreted and managed.

Module 5: Getting onto the field the rover is completely integrated with the application software. After the complete integration, the rover is taken to the field and is tested for proper working. The Rover is allowed to run on the field and the working of the wheels, sensors, sprinkler systems, plough, seed dispenser and the weed remover are tested.

3. ARCHITECTURE

In this project, we will be looking at the use of a multipurpose irrigation robot called Ag-Sense that will be able to plough the soil, sow seeds, irrigation and cropping after the harvest is ready. This will help the farmers in minimizing the use of multiple equipment's in farming. This Agri Bot works with an android application named Groaq. This app controls the Bot in performing various desired tasks as per the farmer's requirement.

Project Requirements:

Components Used:
- DC Motors
- L293D Motor Driver
- Relay
- Water Pump
- Battery
- Cutter
- Seed Dispenser

Software Requirements
- Arduino
- Raspberry Pi
- Python & R
- Any Database Platforms
- Any Frontend tool for developing WebApp
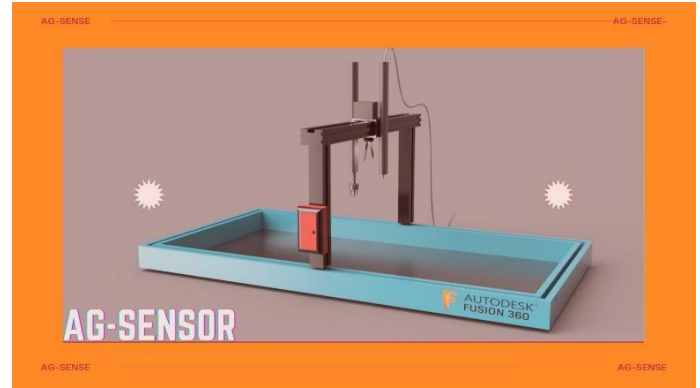
Fig -1 A
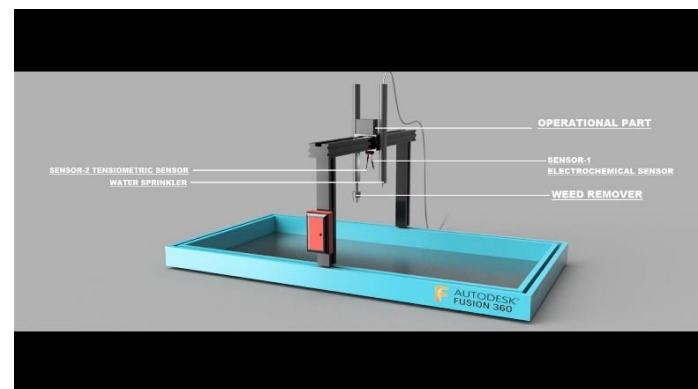
Fig -2: Agribot

4. WORKING PRINCIPLE

The L293D IC boards takes low power voltage and gives sufficient power for the DC motors. Each IC board has 4 input pins such that only 2 DC motors can be connected. One of the IC is used for Cutter and Seed Dispenser, whereas the other one is used for the movement of the wheels. In the soil dispenser, when the motor is turned on, the flap will be rotated 90 degrees which will allow the seed to be dispensed. The ESP8266 will be connected to the internet and all the data and commands will be sent to this via app. The code will be stored in ESP8266 and when Groaq(app) is connected to the server we can be able to control and perform all the desired tasks. We are using a Relay for the Water pump which is connected to a reservoir. This will be controlled by the app. When the plougher is pushed down, it will plough the soil and seed dispenser will be turned on simultaneously from the app. Once the seed is dispensed the soil leveler will level the soil above the seeds.
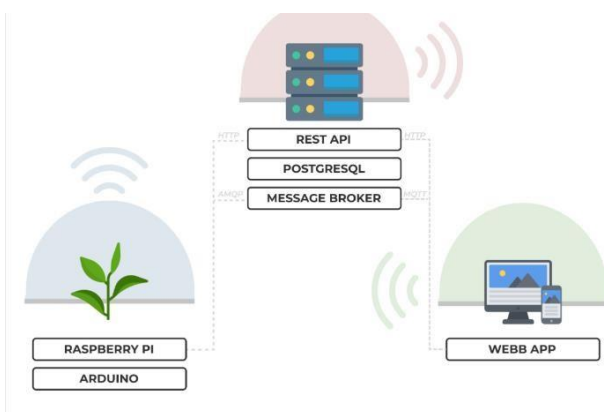
5. FUTURE SCOPE

Agricultural robots or Agribots are already widely used to increase productivity in all aspects of the industry. However, Agribots can do more than just do repetitive tasks. Because of the technology of wireless communication and communication, they can do their job selectively, for example by irrigating, cutting, plowing and fertilizing only the plants they need, and only the fertilizer or water needed, so that nothing can be used. Factors that have hindered the adoption of robots in the agricultural sector include: the availability of cheap agricultural labor, complex processes involved in agriculture (making duplication of robots a real technical challenge), lack research funding, low prices, and other complex relationships and risks affecting agricultural communities. Robots and drones can have a profound effect on farming performance. From drones that monitor and analyze plants, automatic robots like AUSI can sow seeds, fertilize and harvest, the development of agricultural robots all means that human performance can now be devoted to more complex tasks.

Agribots may require significant investment in the futurebut provide long-term results by working 24/7 and protecting themselves from fatigue, stress and illness in an area divided by chronic unemployment, which is why these robots can be legitimate for farmers. With the help of technology, agribot can also be used for a variety of farming applications. For example, it can be used to test the soil and determine which plants will grow better, or which nutrients should be combined to allow existing plants to produce more yields.

ADVANTAGES

• Farmers are now free from busy activities such as farming, sowing, feeding and monitoring animals, etc.
• Agribots like AgSense are not as sick or tired as human beings and no breaks are required so efficiency and productivity increase.
• With high speed and low tolerance, efficiency is high
• The robotics industry offers us the opportunity to reimburse the labor for a good investment profit by providing practical solutions.

• We can use cameras and sensors to monitor farms and detect weeds and identify pests, insects or diseases.
• Since robots are designed for a specific purpose then there is no chance of a major error.
• Using a variety of sensors and technologies we can also get data on seeds, plants, climate, soil etc. and we can predict the best outcome.
• As we use Robots and various processes so it creates job opportunities for people who are interested in working for new or hobbies.
• Non-agricultural people can also successfully farm with new technologies and robots

1. LITERATURE SURVEY
These papers have helped us in delineating and contriving AUSI bot with exceptional ideas and success are the following. We are indeed grateful for these papers which has succored us in presenting our project AUSI.

☐ **"Agriculture Field Monitoring and Analysis using Wireless Sensor Networks for improving Crop Production."**
Paper Originators: B. Balaji Bhanu Department of CSE, KL Univ., Guntur, AP, INDIA, K. Raghava Rao Department of ECM, KL Univ., Guntur, AP, INDIA, J.V.N. Ramesh Department of ECM, KL Univ., Guntur, AP, INDIA, Mohammed Ali Hussain Department of ECM, KL Univ., Guntur, AP, INDIA
The motive of this is to design and create an agricultural monitoring system using wireless sensor network to rise the throughput and standard of farming without discerning it constantly and manually. Temperature, humidity and carbon dioxide volumes are the most prime aspects for the growth, productivity, and quality of plants in agriculture. So, this system periodically measures these parameters inside the fields, thus the farmers or the agriculture experts can observe the measurements from the web simultaneously. Moreover, when a critical change in one of the measurements occurs, then the farmer will be intimated via mobile text message and e-mail by an agriculture expert. With the continuous monitoring of many environmental parameters, the grower can analyze the optimal environmental conditions to achieve maximum crop productiveness, for the better productivity and to achieve remarkable energy savings.

☐ **"Intelligent agent greenhouse environment monitoring system based on IOT technology"**

Paper Originators: Liu Dan China University of Petroleum, Cao Xin Nanjing Agricultural University This paper takes CC2530 chip as the core, presents the design and implementation of agriculture Greenhouse Environment monitoring system based on ZigBee technology, the wireless sensor and control nodes takes CC2530F256 as core to control the environment data. This system is made up of front-end data acquisition, data processing, data transmission and data reception. The ambient temperature is real-time processed by the temperature sensor of data terminal node. Processed data is sent to the intermediate node through a wireless network. Intermediate node aggregates all data, and then sends the data to the PC through a serial port, at the same time, staff may view, analysis and storage the data by the PC that provide real-time data for agricultural greenhouse, fans and other temperature control equipment, and achieve automatic temperature control.

☐ **"Wireless Sensor Network Based Automated Irrigation and Crop Field Monitoring System and scheduling systems"**

Paper Originators: G Nisha and J Megala.

Wireless sensor Network based automated irrigation system for optimize water use for agricultural purpose. The system consists of distributed wireless sensor network of soli- moisture, and temperature sensors placed in the crop field. To handle the sensor information Zigbee protocol used and control the water quantity programming using an algorithm with threshold values of the sensors to a microcontroller for irrigation system. The system has powered by solar panel and Cellular-internet interface for data inspection. A wireless camera is fixed in crop field to monitor the disease area using image processing technique. The system is low cost and energy autonomy useful in water limited geographically isolated areas.

6. CONCLUSIONS

The project introduces wireless technology, IoT and Artificial intelligence in the agricultural sector. It reduces manual labor and can work in any type of weather as well as work continuously unalike humans. The time required to perform five tasks is

significantly reduced compared to performing the same tasks manually. It is designed to help farmers reduce their workload and increase productivity with its many functional features such as automatic planting system, automatic irrigation, automatic crop cutting etc.

This Ag-Rpver project is being implemented with simulation and computer hardware. It connects via Wi-Fi with the operator and with the rover which is implemented all over the land. Agri Bot has a complete working area due to its shape and structure. Different operating modes have been found to control its movement, transmitting signals using a Wi-Fi module and with the help of Iot and Artificial intelligence, a large number of robots are assembled in a distributed and decentralized way. This basic design of autonomous robots can be transformed with few changes and can be built to cover a large area of land for efficient agricultural activities.

By building this robotic vehicle with its many agricultural features, it overcome the difficulties of farmers in cultivating their land at all times of the year no matter what the weather on that day. Considering all the circumstances, a robot integrated with different small modules can be used for rescue and agricultural purposes around the world especially countries like India where agriculture provides the main livelihoods of large Indian populations.

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AI ASSISTED FARMING FOR CROP RECOMMENDATION AND FARM YIELD PREDICTION

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ABSTRACT

Machine learning is a crucial decision-support tool for forecasting agricultural yields, enabling judgments about which crops to cultivate and what to do when in the growing seasonFor this study,we performed a Systematic Literature Review(SLR) to find and combine the methods and components that are employed in agricultural prediction research. Using inclusion and exclusion criteria from six internet databases, we chose 50 publications out of a total of 567 that met our search criteria for relevancy.We thoroughly examined the chosen publications, applied, and offeredrecommendations for additional studies.

Our data show that temperature, rainfall, and soil type are the most often used characteristics in these models, and artificial neural networks are the most frequently used methodology. This observation was based on an examination of 50 publications, and we next looked for studies employing deep learning in additional electronic databases. We gathered the deep learning algorithms from 30 of these publications that we discovered. Convolution Neural Networks(CNN),Long-Short Term Memory(LSTM), and Deep Neural Networks are the three deep learning algorithms that are used in these investigations, according to this additional analysis(DNN).

INTRODUCTION

Many industries employ machine learning(ML) techniques, from estimating customer phone usage to examining customer behavior in supermarkets. Agriculture has long used machine learning. Crop production prediction is one of the difficult issues with precision farming. This far, several models have been proposed and confirmed. Since agricultural production depends on many parameters, including climate, weather, soil, fertilizer use and seed type, this difficulty necessitates the usage of several datasets. This demonstrates that forecasting agricultural production is a complex process that requires a number of difficult steps. The actual yield can currently be roughly predicted using crop yield prediction models, but improved yield prediction performance is still desired. Using a range of features, machine learning, a branch of artificial intelligence (AI) that focuses on learning, is a practical technique that can estimate yields more precisely. By identifying patterns, correlations, and relationships, machine learning (ML) may extract knowledge from datasets. The datasets must contain results that are modelled based on prior information in order to train the models. The predictive model is constructed from multiple elements, and as

a result, the model's parameters are determined using previous data collected during the practice period. Previously collected data from the training phase is used in part during the testing phase to assess performance. An ML model can be either descriptive or predictive, depending on the research problem and goals. Descriptive models are used to learn from the data gathered and explain what has happened, while predictive models are used to forecast the future. ML research encounters a number of challenges while seeking to build a high-performance predictive model. The right algorithms must be selected in order to solve the current issue, and both the algorithms and the supporting platforms must be capable of handling the volume of data. To get a general overview of the work that has been done on the application of ML in crop production prediction, we carried out a comprehensive literature review (SLR). A systematic literature review (SLR) identifies possible research holes in a particular area of study and offers advice to academics and practitioners who want to do new research in that area. Utilizing an SLR technique, all relevant studies are retrieved from electronic sources, summarized, and presented to answer the research questions outlined in the research An SLR investigation offers fresh

perspectives andsupports knowing the state of the art through academia.

CROP YIELD PREDICTION

Crop production prediction is one of the tough issues in agriculture. It is essential to decision-making on a global, regional, and local scale. When estimating crop yield, crop, soil, climatic, environmental, and other aspects are taken into consideration. The three factors that are most usually employed are temperature, precipitation, and soil type. The most popular machine learning algorithm is neural networks. The most widely used deep learning algorithm is CNN. For the globe to produce enough food, it is essential to be able to predict crop yield. Policymakers must decide when to import and export food in a timely manner based on accurate projections in order to boost national food security.

DECISION SUPPORT SYSTEM

An organization or business employs a decision support system (DSS), which is computer software, to support decisions, assessments, and courses of action. Massive amounts of data are sorted and examined by a DSS, which builds up in-depth knowledge that may be used for problem-solving and decision-making. A decision support system (DSS) is a computer programmer that aids in decision-making for enterprises. There are

huge amounts of data. The best options are then provided to an organization after being assessed.

MACHINE LEARNING

A subfield of computer science and artificial intelligence (AI) called "machine learning" aims to mimic human learning by using data and algorithms to gradually increase a system's accuracy. Many commercial and professional procedures as well as our daily lives have substantially benefited from contemporary advances like machine learning. This branch of artificial intelligence (AI) focuses on employing statistical methods to create intelligent computer systems that can gain knowledge from pre-existing databases.

DEEP LEARNING

A neural network is a network having three or more layers, and deep learning is a branch of machine learning. These neural networks attempt to emulate human brain activity and allow it to "learn" from enormous volumes of data, despite the fact that they are unable to match the human brain's powers in any way. A machine learning technique known as deep learning teaches computers to learn by imitating human behavior. One of the key technologies in autonomous vehicles enables them to recognize a stop sign or distinguish a pedestrian from a lamppost.

RELATED WORK

Using data mining techniques, the tropical wet and dry climate zones of India's rice crop yield can be predicted.

Gandhi et al. have made a nicety proposal in their study. Data mining is the process of uncovering hidden patterns in massive, complicated data sets. It could be crucial in the process of making choices regarding complex agricultural challenges. Data visualization is also important to understand the broad trends of the impact of the many factors affecting crop output. The productivity of the rice crop is investigated in this study using data visualization tools to identify correlations between meteorological factors. The study also employs data mining techniques to extract knowledge from the historical agriculture data set in order to anticipate rice crop output for the Khari season in India's Tropical Wet and Dry climate zone. Microsoft Office Excel has been used to illustrate the data set using scatter plots. The categorization algorithms have been tested using WEKA, a free and open source data mining tool. The experimental data contains information on sensitivity, specificity, accuracy, F1 score, Mathew's correlation coefficient, mean absolute error, root mean squared error, relative absolute error, and root relative squared error. The data visualization shows broad trends showing higher minimum, average, or maximum temperature for the season as well as lower precipitation in the selected climate zone increase rice crop productivity. The experimental results showed that for the current data set, J48 and LAD Tree had the best accuracy, sensitivity, and specificity. The accuracy, sensitivity, and specificity of the LWL classifier's classification results were the lowest.

Utilizing the Hadoop Framework and the Random Forest Method

In this study,ShriyaSahuet al., proposes With the development of information technology, big data has become a trendy topic. Since agriculture is essential to human survival, it must significantly advance crop data analysis. This study demonstrates how to employ a big data technique to derive insights from reliable agricultural data. In crop analysis where data is collected remotely, successfully gathering the valuable data pushes a framework toward severe computing challenges. In order to store a sizable amount of crop data for the storage purpose of massive data availability in agriculture, we intend to employ the Hadoop architecture for our work. This method enables farmers to predict which crops to plant in their fields in order to boost output more precisely. The Map

Reduce programming model and the Random Forest technique are both used in the Hadoop architecture. The world's population, which is projected to grow daily during the next 35 years, will probably surpass 10 billion people. Significant improvements in agricultural productivity and disaster management are now needed to feed the world's population. Making projections requires gathering data from a variety of agricultural sources. Weather conditions have an impact on agricultural management and productivity. Future agriculture will depend heavily on weather forecasts.

Utilizing Data Mining to Predict Crop Yield

In this research, Shute Mishra et al. make the argument that the agriculture sector has a particularly large impact on India's economy. 50% of India's population works in it, and it contributes 18% of the nation's GDP. The people of India have long engaged in agriculture, but the outcomes have never been satisfactory due to a variety of factors that affect agricultural output. To meet the needs of approximately 1.2 billion people, a sufficient crop output is essential. Variables including soil type, precipitation, seed quality, a lack of technical capabilities, etc. have a direct impact on agricultural production. As a

result, farmers must make informed decisions when selecting new technologies rather than depending on easy fixes in order to fulfil the growing demand. This project analyses agricultural datasets and builds a crop yield forecast system using data mining techniques. Several classifiers, including J48, LWL, LAD Tree, and IBK, are used for prediction. Then, the effectiveness of each is contrasted using the WEKA tool. One of the qualities used to assess performance is accuracy. The values of Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), and Relative Absolute Error are used to further assess the classifiers' accuracy (RAE). The algorithm will operate with more accuracy as the error value decreases. The basis for the result is a comparison of the classifiers. The process of analyzing, extracting, and anticipating pertinent information from enormous amounts of data in order to find patterns is known as data mining. Using this technique, businesses can turn client data from its raw form into information that is useful. After choosing the data, data mining preprocesses, transforms, and searches for patterns that can be applied to forecast pertinent insights. The pre-processing step includes the detection of outliers and missing values, while the transformation step includes the discovery of object correlation.

Predicting Annual Yield of Major Crops Using Data Mining Techniques and Suggestions for Planting Different Crops in Different Bangladeshi Districts

The development of agricultural products is controlled by a number of factors, including geography, economy, biology, and climate, according to A.T.M. ShakilAhamedet al. in this research. With the appropriate statistical approaches, the effects of many variables on agriculture can be quantified. By using such procedures and approaches to historical agricultural yields, it is possible to obtain information or knowledge that can help farmers and government organizations establish better decisions and policies that enhance productivity. The main focus of this article is the use of data mining techniques to estimate crop production for major cereal crops in important districts of Bangladesh. An important field of research that supports the security of the world's food supply is crop yield forecasting. Bangladesh is one of the top rice producers in the world, and the country has good soil for growing rice. It was the sixth-largest crop producer in the world in 2012, producing 33,889,632 metric tons of rice overall [9]. To take full advantage of the subtropical climate and soil of Bangladesh, farmers must be properly informed on the best time to plant crop seeds. The yield

from the annual crop also contributes to the national economy. It is essential to consider environmental factors particular to each of these locations because different districts in Bangladesh have distinct climates. The best areas for various types of agricultural cultivation can be identified using this data. Additionally, there are regional variations in rainfall, which has a big impact on farming. Because the ideal crop output depends on the proper amount of rain, whereas crops might be damaged by either too little or too much rain. Since the amount of rain varies by district, so does the humidity that comes with it. A area with the ideal annual rainfall average and humidity are required. Humidity controls how much water the atmosphere can absorb before keeping crops too wet or too dry, preventing them from developing properly and yielding.

Global and Regional Crop Yield Predictions Using Random Forests

Accurate crop output estimates are crucial for the creation of effective agricultural and food policy at the regional and global levels, according to Jig Han Jeonget. In order to assess Random Forests' (RF) ability to predict crop production responses to meteorological and biophysical variables at both the global and regional levels in wheat, maize, and potato, we compared it to multiple linear

regressions (MLR), the industry standard. We employed crop yield data from numerous sources and regions, including gridded global wheat grain production, maize grain yield from US counties spanning thirty years, potato tuber and maize silage output from the northeastern seaboard, for the training and testing of our model. RF was found to be highly good at projecting crop yields and beat MLR benchmarks in all performance data that were examined. For example, in every test case, the root mean square errors (RMSE) for RF models ranged from 6 to 14% of the average observed yield, whereas the same values for MLR models ranged from 14% to 49%. Our results show that RF is an effective and adaptable machine-learning method for crop production estimates at regional and global sizes because to its high accuracy and precision, ease of use, and value in data analysis. RF may result in a loss of accuracy when expecting the extreme ends or answers outside the parameters of the training data.

EXISTING SYSTEM

The harvest's yield is affected by the occasional climate. India's weather conditions are continually moving. During dry seasons, ranchers deal with difficult issues. This prompted the utilization of a few AI calculations to assist ranchers with choosing the harvest that would offer the best yield. They utilize a scope of information from earlier years to figure future information. SMO classifiers in WEKA were utilized to classifications the outcomes. The essential elements considered are the typical temperature, least temperature, greatest temperature, and information on the harvests and yields from the earlier year. Utilizing the SMO device, the former information was parted into two classes, high return and unfortunate yield. The harvest yield conjecture result acquired utilizing the SMO classifier is less exact when contrasted with innocent Bayes, multi-facet insights, and Bayesian organizations. Every one of the temperatures saw, normal, least, and most extreme have an influence. They likewise added a pristine variable called crop evapotranspiration. The yield's evapotranspiration is affected by both the climate and the phase of plant development. This characteristic is considered to pursue an educated choice with respect to the yield regarding the gatherings. They gathered the informational collection with these qualities, took care of it into the Bayesian organization, and afterward partitioned it into the valid and bogus classes. The exactness not set in stone by looking at the noticed orders in the model to the anticipated groupings in the model using a

chaos organization. They in the long run arrived at the goal that using Blameless Bayes to measure crop yields Besides, a Bayesian association has more prominent exactness than a SMO classifier, making it more valuable to foresee crop yield under fluctuated climatic and farming conditions. Utilizing information mining procedures and verifiable horticultural result and climatic information, a few forecasts that increment crop yield are delivered. It is important to set up a choice emotionally supportive network to help ranchers in making taught decisions with respect to the yield and soil to be developed. They gathered the information, which incorporated the harvest season, region, and result in hectares, and used WEKA to dissect it utilizing various calculations. The exactness of four unmistakable information investigation strategies was assessed and differentiated. The four techniques utilized in WEKA are J48, IBK, Fellow trees, and LWL. Contingent upon the kind of dataset and its qualities, they arrived at the resolution that the IBK had achieved more exactness than the others.

PROPOSED FRAMEWORK

Before directing the deliberate survey, an audit technique is laid out. The assessment was led as per Kitchen Ham's popular survey systems. The initial step is to characterize the exploration questions. When the exploration questions are ready, data sets are utilized to choose the applicable investigations. The data sets utilized in this examination were Science Direct, Scopus, Web of Science, Springer Connection, Wiley, and Google Researcher. After the relevant examinations had been chosen, they were sifted and assessed utilizing a bunch of prohibition and quality standards. From the chose studies, all pertinent information is extricated, and the joined information with the removed information is utilized to respond to the exploration questions. The three components of the methodology we utilized are plan audit, direct survey, and report survey.

The underlying stage is to design the survey. Right now, research questions are recognized, a convention is made, and ultimately the interaction is tried to check whether the arrangement will work. Alongside the review subjects, the distributing settings, beginning inquiry terms, and distribution determination measures not entirely settled. The convention is indeed different to check whether it really epitomizes a satisfactory audit strategy after this information has been all characterized.

ARCHITECTURE DIAGRAM
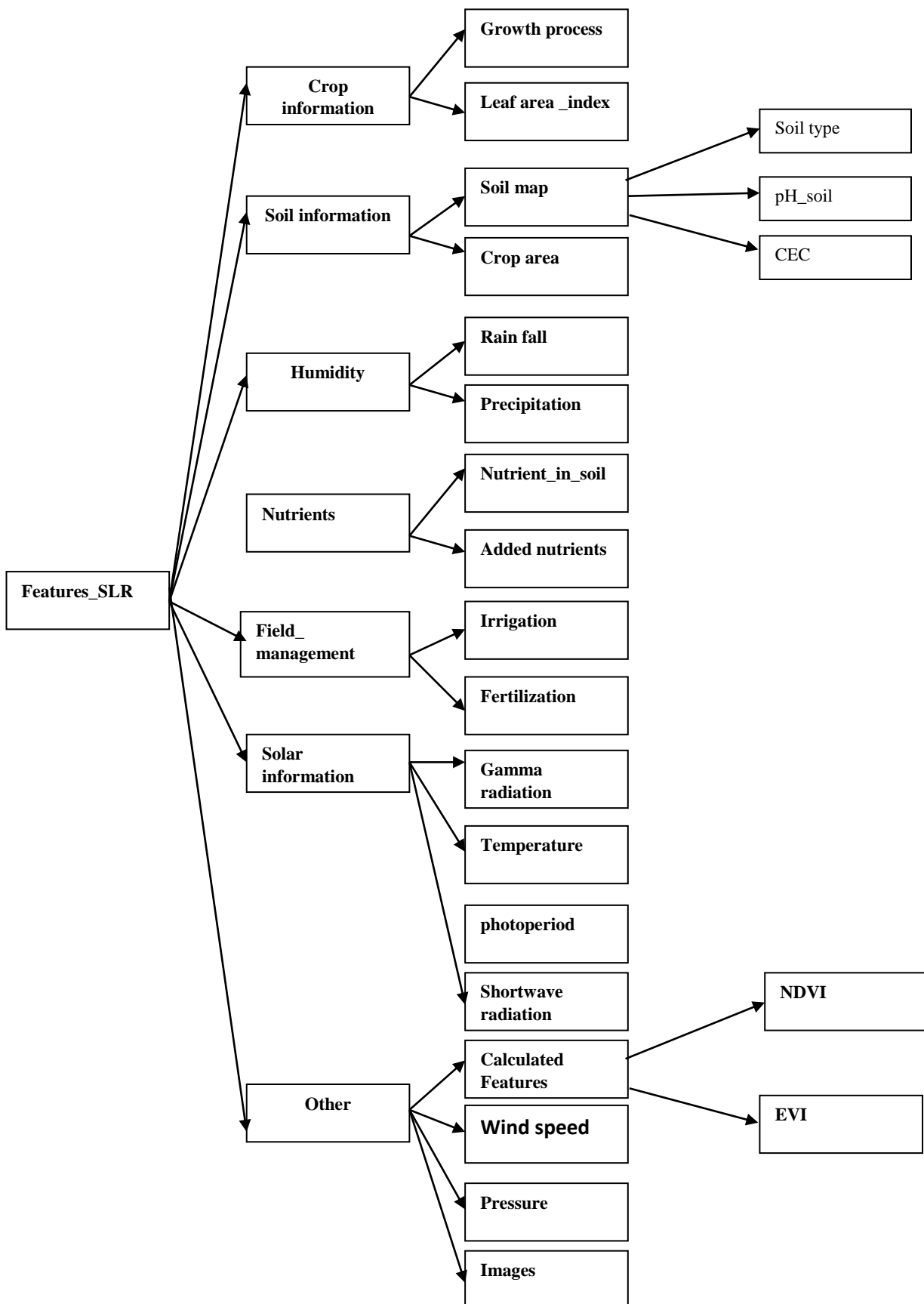
TABLE: 1

Key	Evaluation parameter	# of times used
RMSE	Root mean square error	29
R2	R-squared	19
MAE	Mean absolute error	8
MSE	Mean square error	5
MAPE	Mean absolute percentage error	3
RSAE	Reduced simple average ensemble	3
LCCC	Lin's concordance correlation coefficient	1
MFE	Multi factored evaluation	1
SAE	Simple average ensemble	1
Rcv	Reference change values	1
MCC	Matthew's correlation coefficient	1

TABLE: 2

Most used machine learning algorithms.

Applications Advances, "Rice Crop Yield

Most used machine learning algorithms	# of times used
Neural Networks	27
Linear Regression	14
Random Forest	12
Support Vector Machine	10
Gradient Boosting Tree	4

CONCLUSION

Artificial intelligence in the agricultural field not only helped farmers to automate farming but also shifts to precise cultivation for higher crop yield and better quality using fewer resources. Companies involved in improving machine learning or artificial intelligence based products or services will get technological advancement in the future and will provide more useful applications to this sector helping the world deal with food production issues for the growing population.

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AI BASED VISUALLY IMPAIRED HINDRANCE OBSERVER
AND NARRATOR ASSISTANT

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1. ABSTRACT:

Mobility is one of the difficult tasks in day to day life of blind people.The prime basis of this project is to create an appreciated care for mobility of visually impaired people. The SmartVision prototype is a small, cheap and easily wearable navigation aid for blind and visually impaired persons. Its functionality addresses global navigation for guiding the user to some destiny, and local navigation for negotiating paths, sidewalks and corridors, with avoidance of static as well as moving obstacles.

2. Literature Review Model:

In this period of industry 4.0, there are huge technologies which are developed to overcome the hardships in regular life. But still there is discomfort in the life of the physically challenged people.

Physical blindness is defined as a congenital or subsequent loss of vision.people not only affected with complete blindness also with partially sighted. It means that it is the disability of the people who are unable to differentiate the light from the darkness. The leading causes of this physical blindness is due to uncorrected refractive errors and cataracts, glaucoma,diabetic retinopathy,age related macular degeneration.Even Though blindness affects the all age category but the major effect is at the age of 50 years.

Surgery is the way to overcome this defect. But it is not applicable to all people due to its financial cost. This in turn makes the visually impaired people to use the white canes or seek help from other persons or it tends to use guided dogs.

3. PROPOSED FLOW MODEL:
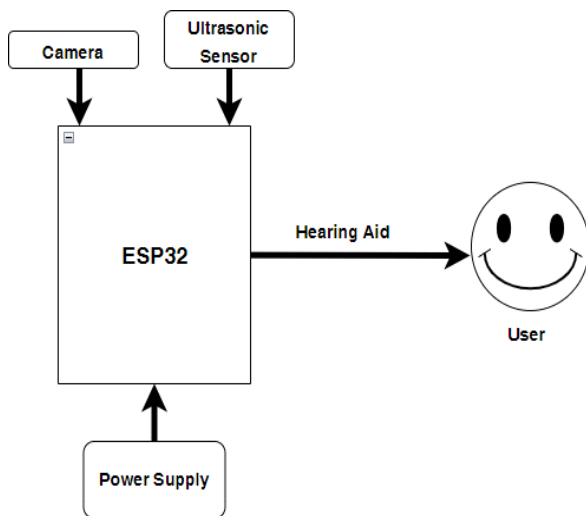
4. ARTIFICIAL INTELLIGENCE:

While a number of definitions of artificial intelligence (AI) have surfaced over the last few decades, John McCarthyoffers the following definition in this 2004 paper (PDF, 106 KB) (link resides outside IBM), " It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable."

5. SPECIFICATIONS:
5.1. ESP32:

Block Diagram

ESP32 is the heart of this device. It is a microcontroller built by Espressif. ESP32 is highly-integrated with in-built antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. Engineered for mobile devices, wearable electronics and IoT applications, ESP32 achieves ultra-low power consumption with a combination of several types of proprietary software.ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

5.2. ULTRASONIC SENSOR:

Ultrasonic Sensors have been used throughout many applications and also in industries. It measures the distance of the object around 10-30 cm through emitting the ultrasonic sound waves.It transmits ultrasonic sound waves around 40KHz from its sensor[6].These sound waves fall on the object and get reflected. Later, the reflected ultrasonic sound waves can be converted into electric signals. Here, the reason for the use of ultrasonic waves is because it travels faster than the audible sound which means that sounds that humans can hear. Usually, these sensors contain modules which include transmitter, receiver and the control circuit.
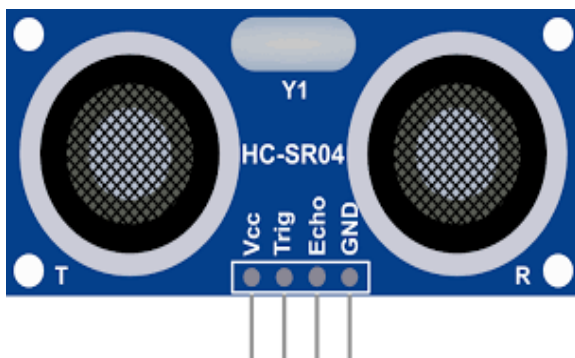
Whenever the obstacles come, the sound waves reflected are converted to electrical signals like as above said and when the electrical pulse is applied to the ultrasonic transducer, it vibrates across a specific spectrum of frequencies and generates the sound waves.

5.3. CAMERA:

Object tracking is always challenging research to the computer vision community. It becomes more difficult at night video systems due to low contrast against the background.But it is an essential thing which is used to help the visually imapired people to know the objects which are present in their pathway in night time.

5.4. HEARING AID:

The detected obstacle is converted to text and the distance is measured by an ultrasonic sensor. The distance and the detected object's text are converted to audio and heard by the user with the help of a hearing aid.

5.5. TEXT RECOGNITION:

If a blind person wants to read a book, they either have to learn Braille or to hear voices. Everyone has their own preferences. This device captures the text and converts it into an audio file

47
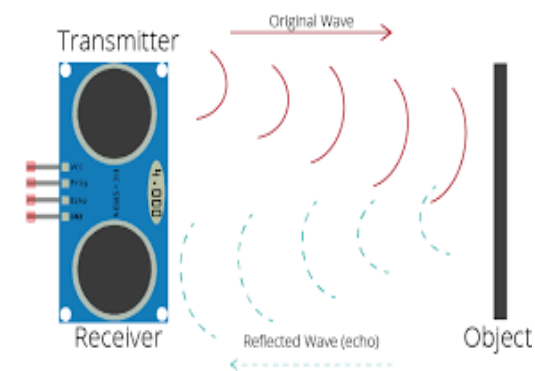
using the gTTS library.

5.6. POWER SUPPLY:

The power supply is an electrical device that supplies electric power to an electrical load.

6. APPLICATIONS

- No need to carry a stick every time they go out.

- No need for anyone's assistance. They can move to any place by themselves.

- Camera is enabled with night vision, which helps the blind person to travel during the night time too.

- With this device, the blind person can also read books and papers without braille.

- The texts in the books are recognised and converted to audio with a machine learning algorithm.

7. CONCLUSION:

Artificial intelligence Technology is advancing space each day, raising different aspects of the lives of individuals with disabilities, autism, the senior, the visually impaired and different people in need of care. To assist these folks, machines should understand the senses on their own and have the sympathy to solve issues. Our computer science researchers and experts try to make the devices or machines real. There is no doubt that within the coming decades the machines we have a tendency to visit will pronto perceive the human senses and solve issues accordingly. Now, psychotherapy and therefore the diagnosing of other chronic psychological issues square measure is usually prohibited mechanically. The machine is sort of a nice assistant for doctors and can facilitate them. We have a tendency to design an

awfully distinctive text recognition and feeling detection device to extract text areas from good backgrounds. Equivalence feature maps estimate the worldwide structural options of text at the element level. We have a tendency to project by coaching and testing a typical subject area project for generating CNNs in real time. we have a tendency to begin by fully removing the totally connected layers and reducing the quantity of parameters within the remaining convolutional layers.

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AN EFFICIENT ENERGY BASED ROUTING APPROACH FOR WIRELESS SENSOR NETWORKS

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ABSTRACT – Wireless Sensor Network (WSN) is a collection of sensor nodes communicate with each other and sharing the information between the networks. Sensor nodes are low power and low cost devices are used to construct the network. Sensor based networks are used in various integrated applications. One of the most benefited sensor based application is Internet of Things (IoT) applications. In IoT applications, the physical components are data sources and collected information's are transmitted through the network in the mode of intermediate node access. All the physical components or sensors are battery powered in nature, so the energy was play a vital role in WSN based IoT applications. Energy of nodes will decide the lifetime of network and accurate data transmission between the nodes. Now, the researchers focusing on the Energy Harvesting techniques for improve the lifetime of the network. We propose a new EH-WSN based hybrid novel clustering based routing approach called Energy Efficient Clustering and Route Optimization Scheme in Energy Harvesting Wireless Sensor Networks (EECROS-EHWSN). The proposed scheme combined with two aspects, initially, the node energy information's are

collected and based on the energy level it is clustered. Secondly, the route formation between the nodes and data transmission is made through the genetic based approach. Our proposed approach will provide the efficient usage of energy, packet delivery ratio and throughput.

Keywords: - WSN, Sensor nodes, IoT Applications, Energy Consumption, Energy Harvesting, Clustering, Genetic Approach.
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I. INTRODUCTION

Wireless Sensor Networks (WSNs) are constructed and configured using the N number of sensor nodes. It is self configured, battery powered and infrastructureless devices. These sensor nodes are used to monitor the environment then collect and aggregate the data from the environment. A sensor node consist of three elements, i) Sensing Element ii) Processing Elements iii) Wireless Communication Element. The sensor nodes communicating with each other in the network and collecting the data from the neighbor nodes, it would be transmitted to the sink or base station. Sensor nodes are operated by battery power and each sensor node has global identification to know the place of the sensor. Data transmission between the sensor nodes and to the sink is very expensive because transmitting one bit of data is equal to the processing more than thousands of operations in a sensor node. So it is mandatory to reduce consumption of sensor nodes in a network. Data collection is an important part of sensor node in WSN. This data collection is made by the sensor nodes in three

possible ways. One is data collection through the individual sensor nodes to sink, secondly, data collection through the network based sensor nodes, and finally, data collection through the sensor nodes of mobile sink. The sink is act as an intermediate between the sensor nodes and the user. According to these strategies, the network based sensor node data collection is suitable for reducing the energy consumption between the nodes. The sensor nodes are arranged in the form clusters or any type of network structure. They are sensing the environment and collecting the data from the neighbor nodes in the network.

There are previous studies elevates EH-WSN applications are implementing the technique called sensing subsystem, the findings illustrate that, it is difficult to send data directly to the sink node. In our proposed methodology, the networking based subsystem is implemented for data collection and aggregation. Data aggregation means to collect the various data from the node sin the network and checking the uniqueness of the data then it forwarded to sink. This kind of data transmission is called the hierarchical approach or sometimes referred as hierarchical based network approach. This can be classified into four types; i) Clustering approach ii) Chain based approach iii) Tree based approach iv) Hybrid approach. We focus the problem of increase the network lifetime through the energy harvesting based WSN.

The proposed system follows cluster based network approach defines sensor nodes are grouped and/or formed as clusters. A single node is selected as a head node based on the node parameters among the nodes and it is act as a representative of all other nodes. It is called cluster head. The CH sensing the environment and received the data from all other nodes and process the data and send it to the base station or sink node. We propose adaptive data quality with energy harvesting aware algorithm for enhance the quality of the applications and improve the performance of the applications with less energy usage.

Our contribution is to address the problem of increase the network lifetime and improve the quality of the WSN based applications.
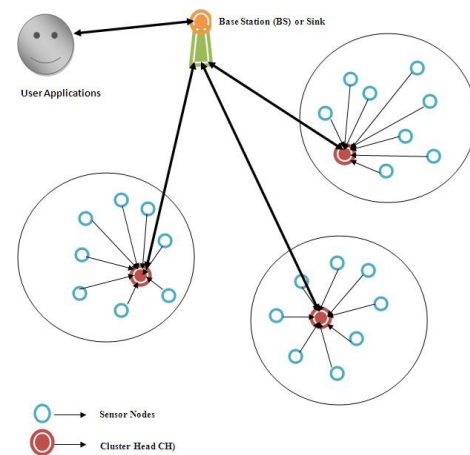
Figure 1: - Clustering based Approach

This paper is organised in section 2 describe about the review of the literature related to the problem of prolong the network lifetime through energy harvesting of the nodes. The proposed methodology describes in section 3, the simulation results and performance analysis of the proposed method is described in section 4, and finally, conclusion is presents in section 5.

II. RELATED WORK

At present wireless sensor network is place the wise role in all aspects of technology development. To implement the WSN based applications in the environment for monitoring, data collection and decision making processes. The researchers concentrate on the various techniques and methodologies involved in wireless sensor network routing and increase the network lifespan. So this section analyzes the energy efficient and energy harvesting routing methodologies of wireless sensor network based applications.

Nabil Ali Alrajeh et al [5]. (2013) introduce a secure protocol for energy harvesting based WSN. This protocol is designed like cross layer based information exchange between the nodes. All the nodes are directly communicate with cluster head so the energy consumption of each is node is reduced. The data transmission is done through the two-hop neighboring mechanism and this secure transmission follows the cross layer design with network parameters. Initially all the nodes are actively involved in the network processes but in the idle state, the nodes are received the energy from the environment and it is converted into harvested energy. Compare with LEACH and HEED, it is more efficient to increase the network lifetime. But the shortfall of

this method is, not possible to get the packet acknowledgement for each transaction so the packet delivery ratio is not achievable in this approach.

Selahattin Kosunalp et al [6]. (2016) deal the energy issue of the sensor nodes. All the sensor nodes are battery powered and it is not possible to retain the energy when they are involved in network operations. Node selection plays a vital role in route discovery from source to destination. The author proposed a new energy prediction algorithm for selection of high energy nodes. This algorithm predicts the energy level of the node based on the history of the transmission. Along with this algorithm a Q-Learning approach is implemented to increase the performance of the optimum use of energy among the sensor nodes. Finally observed that, to manage energy level intelligently in sensor nodes is more important but the above Q-Learning approach is not sufficient.

Chin-Feng Lai et al [7]. (2017) defines that the routing protocols are decided the energy utilization of the sensor nodes. The sensor nodes plays various roles in WSN based IoT applications like storage, processing or computing and energy management. Author proposed a new routing protocol energy-efficient centroid based routing protocol (EECRP) to maintain the network lifetime and less energy consumption of sensor nodes. It consists of three parts. First, the sensor nodes are organised in the cluster formation. Second, the cluster head is chosen based on centroid based approach, that is, the nearest node of the base station. Third, the CH collects the data, processing it and finally communicates to base station with less energy consumption. During the comparative study of EECRP with LEACH and GEEC, it supposes to fail in multi-hop transmission of data packets in the WSN.

Xuecai Bao and Guanqun Ding et al [8]. (2016), proposed a new routing algorithm for maximizing the network performance in energy harvesting wireless sensor network. The routing techniques and methodologies for energy efficient networks are not to fit for energy harvesting WSN. The main objective is to analyze the factors affecting the energy harvesting WSN and to find the best route discovery. This can be achieved using proposed heuristic algorithm. It implements three operations between the sensor nodes. Firstly, find the residual energy of each and every sensor nodes in a WSN. Secondly, select the sensor nodes based on the high residual energyavailability. Finally, the node is communicated based on the less link cost between the nodes and the optimal path is established. However, when the more sensor nodes added in EH-WSN, the average energy consumption of each sensor nodes will reduce and has more energy to serve information transmission.

Yunquan Dong et al [9]. (2016) find the use of energy in the sensor nodes. Energy harvesting technologies plays a vital role in the maximization of network lifetime and achieves the sustainability in the EH-WSN. Author proposes a new energy aware routing protocol for distance-and-energy-aware routing with energy reservation (DEARER). Using this approach, the high energy arrival rate of node is selected as a Cluster Head (CH). The CH is act as a intermediate between the sink and sensor nodes. Also, DEARER permits non-Cluster Head nodes to reserve a place of the harvested energy for further use. In doing so, DEARER selects "enabler" nodes as CH nodes and provides them with more energy, thereby mitigating the energy shortage events at CH nodes. Apart from these, the DEARER protocol point out that, the reservation ration is constant over time. So this leads to be further improvement of network energy efficiency.

Thien D. Nguyen et al [2]. (2017) considered that the energy harvesting to be one of the key aspects of WSN based IoT applications. Energy harvesting techniques could remove the needs of node replacement in the network due to energy efficiency. Author encourages moving the energy-aware techniques to energy harvesting aware routing development in the WSN. Author proposes a new routing algorithm EHARA, which is further enhanced by integrating a new parameter called 'extra backoff'. The proposed algorithm improves the lifetime of sensor nodes as well as the quality-of-service (QoS) under variable traffic load and energy availability conditions. The shortcomings are present in this new approach of energy harvesting aware approach that is, the global information is unable to adapt to variations in sensor nodes' energy levels. Here do not consider the actual amount of harvested energy accumulated during the harvesting period. Use constant rates of replenishment for all sensor nodes in the network. Thus, they cannot deal with the stochastic

characteristics of the ambient energy sources.Varying from the above reviews of different existing EH routing protocols and algorithms for WSN based applications, to address the two major aspects of performance issues in WSN, i) Select the optimal less energy usage path based on the residual energy. ii) Improve the quality of WSN applications with the implementation of energy harvesting techniques. To overcome the limitations of existing methodologies, a new proposed approach called a hierarchical based adaptive routing scheme is introduced to find the optimized energy efficient route and assure the quality of data collection and transmission to applications.

III. SYSTEM MODEL

At present to design of WSN based applications is challenging task. Theoretical evaluations cannot be adequate for many cases to prevent and predict the crash of sensor networks. The design complexity of WSNs rises with growing applications and their requirements. The network lifetime and minimum error margin of data transmission is largely depends on the energy consumption of the nodes. Consequently, different methods have been proposed to reduce the energy consumption of the wireless sensor network. Designing wireless sensor networks has many problems from this point of view.

Energy harvesting is a promising solution to overcome the problem of large energy consumption and network stability. Therefore, we propose a clustering oriented approach called Energy Harvesting based hierarchical approach of adaptive routing with uniform data quality assignment to prolong the network lifetime and stability of the network. The main advantage of clustering is the expansion of sensor networks in terms of scalability of performance. In addition, the clustering approach offers many secondary benefits. It ensures reliability and avoids one-point failure through its localized solutions.

A. Network Model

The elements of our system model consist of collection of sensor nodes. The sensor nodes are supposed to be placed in the unstructured manner according to the energy perspective. The sensor node performs three mandatory activities, which means sensing the data, processing the data and communicates the data. In all three functions,

4data communication in most cases it is a highenergy consuming activity. Because of this, our network model fully addresses the issue of energy consumption. The following conclusions have been made about the testbed.

> ➤ The sensor node formation is done in randomly.
> ➤ Sensor nodes and the base station are fixed (static).
> ➤ The distance between the sensors is defined based on the signal strength.
> ➤ Data aggregation is done through the Cluster Head (CH).

Each senor nodes are represented as s and wireless sensor network consist of n number of sensors (s_1, s_2, s_3, …., s_n). All the sensor nodes are transmitting their data s(i) to the cluster head (CH) and the sensor nodes energy consumption is represented as (Es_1, Es_2, Es_3, …., Es_n). The CH act as an intermediate between the sensor nodes and base station. It performs data aggregation, integration and communicates to base station so it needs more energy to stable the network and active. A cluster head handles two types of messages, one is internal messages and other is external messages. Whose internal messages are nothing but own messages of the cluster head and the external messages are defined as the neighbor nodes data collected by the cluster head. A vast data handling situation occurs in this type approach, it may fail the quality of data transmission between the cluster head and base station.

Data transmission is an important factor for energy consumption in WSNs. Here, we focus on reducing the number of bits transmitting from cluster head to base station through the data compression method.

52

Data Processing

Transmitted to User

Data Communication to Base Station
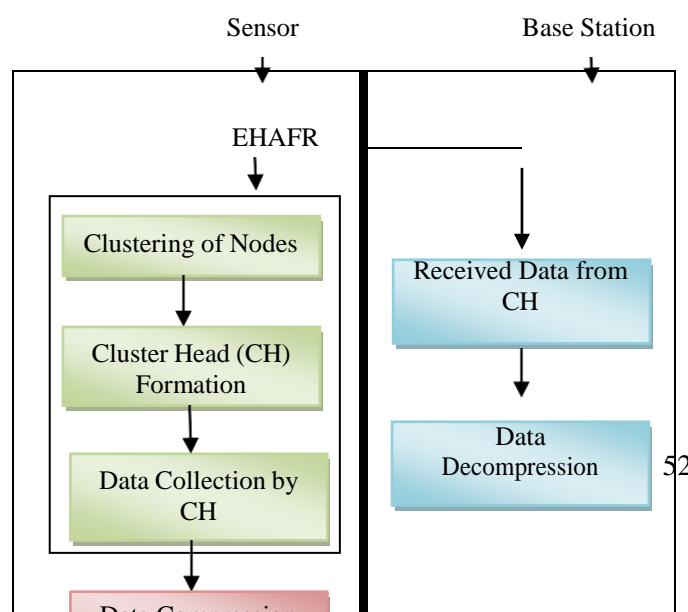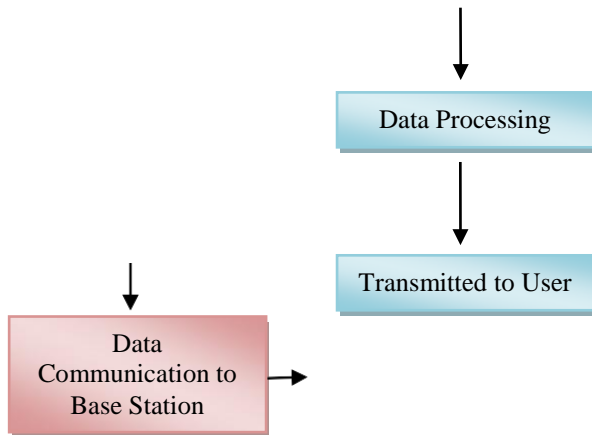
selected as a cluster head and all other nodes are treated as normal node. The proposed method follows three major key variables,

➢ **Calculate the Residual Energy**

This variable represents each and every node calculates its own energy level and it is represented as 'El'. After completing the transmission its energy level is reduces and the remaining energy is measured. 'Et' required energy per transaction, 'El' initial energy level of the node and 'Er' residual energy of the node.

$$Er = El - Et \text{ .... (1)}$$

Figure 2: - Proposed Framework

Due to the flat network approach there is a vast number of communication from sensor node to sink or base station. It will create the overburden to base station and fast exhaustion of the battery. In our proposed hierarchical network model differs from the existing methods, which focus on the energy harvesting type of WSNs. A data collection is made through the special node which reduces the number of messages sent to base station and this improves the energy efficiency of the network.

IV. THE PROPOSED ALGORITHM

Each node is capable of being powered by a battery with energy harvesting. So the energy levels of each sensor nodes are not the same in the network because it is unmanned sensor environment with geographically distributed.

A. Cluster Formation and CH Selection

Initially the sensor nodes are placed and the distance between the each sensor node is measured. In our proposed approach, the base station or sink send the beacon frame to all the sensor nodes. Through this frame, the base station receives the information about the configuration of the network and can also identify the list of eligible nodes available in the network sorted by signal strength. The collection of temporal cluster heads is elected according to the signal strength in the network.

The base station generates the gateway value 'G' is calculated and forwarded to rest of the sensor nodes. Each and every sensor nodes calculated the energy value and it compared with the received gateway value. If the energy value is greater than the gateway value, then the nodes is Node Degree measured

According to this criterion, the total number of neighbors located at a 2-hop distance from cluster head (CH) and measured like,
Node Degree = (Total 2-hop-Nb nodes) / (Nodes)   …. (2)

➢   Betweeness Centrality of the CH.
Using this adaptive method, the betweeness centrality is of nodes to CH is calculated using distributed mechanism. Once

the CH receives the updates from its neighbors then it calculates the betweeness centrality of each and every node.
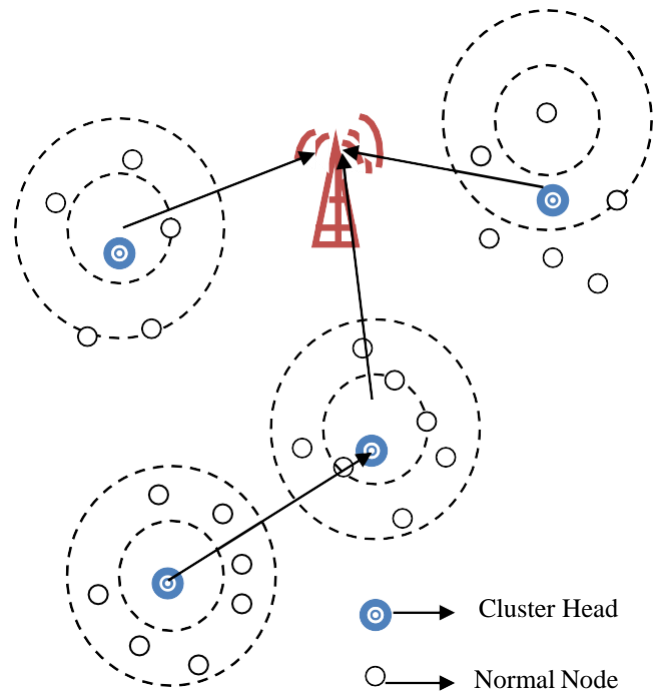
Figure 3: - 2-Hop Clustered WSN

The fuzzy process maps each smooth input value to a set of respective fuzzy member functions for each temporary cluster head over three parameters. The output variable indicates the possibility of a temporary cluster head becoming a cluster head.

Now, each and every sensor nodes are prepares themselves become a member of a cluster and it is joined with the nearest clusterhead. After the cluster formation, the required data is generated and sensed by the members those who are joined in the cluster formation. The cluster head is the Incharge to collect and integrate the data from their members. After the aggregation is over, the cluster head made the compression process to reduce the overload and energy consumption of the cluster head. Finally, the CH communicates to base station or sink and transmit the data.

A. Algorithm: Energy Harvesting Adaptive Fuzzy Routing (EHAFR)
Step 1: Begin
Step 2: S ← Set of Sensor Nodes, $S_1, S_2, S_3, …., S_n$

Step 3:   Status (S[x]) ← M, x=1, 2, …, N.

Step 4: Tch ← Number of Tentative CHs.

Step 5: CH ← Set of Temporary Cluster Heads |
Tch[x], x=1, 2, …, T selected from S.

Step 6: S ← S – CH.

Step 7: Chance[y] ← Probability of CH[y] to
become a Cluster Head, y=1, 2, ….., T.

Step 8: For every Tentative Cluster Head Tch[y],
y=1, 2, …, T.

Step 9: Calculate Chance [y] using fuzzy if-then
mapping rules.

Step 10:   Broadcast   Advertisement
(Chance[y]) to all its 1-hop and 2-hop
neighbours.

Step 11:   While (timer).

Step 12:   If (Advertisement from any CH[x]
& (Chance[y] < Chance[x])).

Step 13:   Add CH[y] to S.

Step 14:   CH← CH- {CH[y]}.

Step 15:   End if.

Step 16:   Else.

Step 17:   Status (CH[y]) ← H.

Step 18:   Broadcast Advertisement (Status
(CH[y])) to all its 1-hop and 2-hop
neighbours.

Step 19:   End else.

Step 20:   End While.

Step 21:   End For.

Step 22:   For every sensor node S[x].

Step 23:   If Advertisement(Status(CH[z]))
received form exactly one Cluster Head
CH[z].

Step 24:   Add S[i] to CH[k].

Step 25:   End if

          Data compression is nothing but to
reduce the number of data transmitted from
cluster head to sink. Usually, the data
compression technique is classified into three
categories according to the recoverability of
original data in the destination part.

   1. Lossy Compression Standard.
   2. Lossless Compression standard.
   3. Unrecoverable Compression Standard.

In lossy compression, some features of the
original content are lost after performing the
decompression. In lossless compression, the
original content is accurately received after
performing decompression. The unrecoverable
compression defines that not possible to recover
the input value of compressed data.

          In our proposed approach, the lossless
compression algorithm is used called adaptive
UDQ arithmetic coding algorithm.

          The adaptive UDQ concentrate on three
basic aspects during the encoding process called
the next symbol to be encoded, the interval and
the probability. The encoder divides the current
interval into sub-spaces, each representing a
portion of the current interval proportional to the
probability of that index in the current space. Any
space that corresponds to the actual symbol next
to the symbol becomes the space used in the next
step.

          When all symbols are encoded, the
resulting space clearly identifies the sequence of
symbols it has created. Anyone using the same
end space and model can reconstruct the code line

Average No. of CH nodes per round
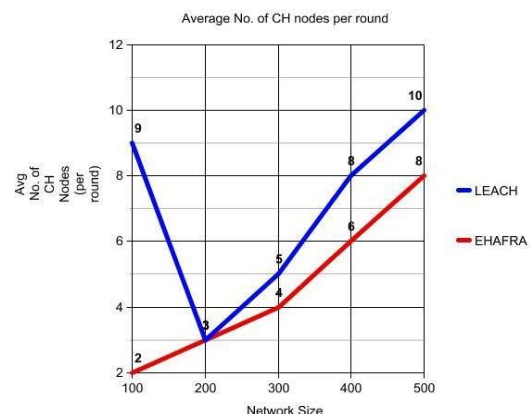
that must have entered the encoder at that final
interval. However, there is no need to transmit the
final break; It is necessary to transmit only a
portion of that space. In particular, it is only
necessary to transmit enough fractions so that all
fractions beginning with those digits fall into the
final interval; this will guarantee that the resulting
code is a prefix.

   For example, note that arithmetic encoding can be
implemented by changing the base or radix if the
symbols have equal probabilities. In general,
arithmetic (and range) encoding can be interpretedas
a general transformation of radix. For example, we
can see any sequence of symbols: The result shows
the efficient use of energy inthe network and
network lifetime is illustrated.

i) No. of CHs per round: -

          This Immediate action reflects the number
of nodes.

This will send the data directly to the base station.

Figure 5: -Average No. of CH nodes per round

The results show that EHAFRA outperformed LEACH for most of the cases. EHAFRA showed better scalability in more than 90% of the networks under test. This is because EHAFRA uses a larger number of CHs that cover the network.

V. CONCLUSION

In this paper, we have focus on two things, that is, prolong the network lifetime and quality of data transmission between the nodes and the base station. This can be achieved through the energy harvesting based wireless sensor network. Here, we propose an hierarchical energy harvesting adaptive fuzzy routing algorithm, referred as EHAFRA, to address the fuzzy based cluster head

'DADASD'

Assume that the symbols involved form a sorted set, and that each symbol in the sorted set represents a continuous integer A = 0, B = 1, C = 2, D = 3, and so on. This results in the following frequencies and cumulative frequencies
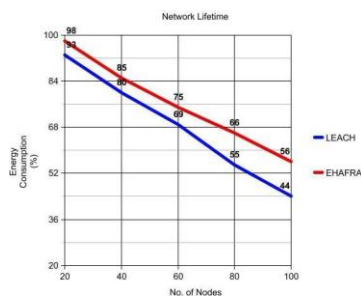
selection and also introduce the UDQ data compression technique to reduce the amount of data transmission between the CH and base station. The results declared that the proposed system improves the network lifetime and achieve the quality requirements of the network.

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An Unpredictability-Aware Deep TransferLearning-Based Structure forCOVID-19Diagnosis

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Abstract— Theearlyand reliabledetectionofCOVID-19 infectedpatients is essentialto prevent andlimit its outbreak.ThePCRtestsforCOVID-19detectionarenotavailableinmany countries, and also, there are genuine concerns about theirreliability and performance. Motivated by these shortcomings,this articleproposes a deep uncertainty-aware transfer learning framework for COVID-19 detection using medical images.Four popular convolutional neural networks (CNNs), includingVGG16,ResNet50,DenseNet121,andInceptionResNetV2,arefirstappliedtoextractdeepfeaturesfromchestX-rayandcomputed tomography (CT) images. Extracted features are thenprocessedbydifferent machinelearning andstatistical modeling techniques to identify COVID-19cases.We also calculateand report the epistemic uncertainty of classification results toidentify regions where the trained models are not confident abouttheirdecisions(outofdistributionproblem).Comprehensive simulation results for X-ray and CT image data sets indicate that linear support vector machine and neural network models achievethe best results as measured by accuracy, sensitivity, specificity,andreceiveroperatingcharacteristic(ROC)curve(AUC). Also, it is found that predictive uncertainty estimates aremuchhigherforCTimagescompared toX-rayimages.

INTRODUCTION

ScreeningsuspectedpatientsandtheearlydiagnosisofCOVID-19 is the best way to prevent its outbreak within asociety.Thesoonerthediagnosis,thefasterandsmootherthe medical recovery. The real-time polymerase chainreaction(realimePCR)isthestandard testfordiagnosisofCOVID-19[2].Thereareothercomplementary testingframeworks aswell.A deep learning-based framework for COVID-19 detectionusing CT images was proposed in [15]. The reported experimental results in this article show that the proposed modelprecisely identifies the COVID-19 cases from others with anarea under the receiver operating characteristic (ROC) curve(AUC)of0.99andarecall(sensitivity)of0.93.In[16],machinelearningtechniquesareappliedforthedetectionofCOVID-19casesfrompatchesobtainedfrom150CT images.Thenumberofcollectedsamplesis 499 that are processed using segmentation techniques and 3-DCNNs.Adeep learning framework isalsoproposed in[18]for detection of COVID-19 and influenza-A viral pneumonia.The overall accuracy of developed models for 618 CT imagesis86.7%.Lastbut not least,wealsoinvestigate the impact oflackofdataon the reliability and quality of the classification results. Thetype of uncertainty that is important for deep learning modelsused for COVID-19 diagnosis is epistemic uncertainty,

whichcaptures the model that lack of knowledge about the data [24].Wethendevelopanensembleofneural networkmodelstrainedusingdifferent deepfeaturestogenerate predictiveuncertainty estimates. The quantified epistemic uncertaintiesprovide informative hints about where and how much one cantrustthemodelpredictions.Allthese studiesreport promising results for CNNmodels trained using a limited number of images. Deep neural networks often have hundred and thousands of trainable para-meters that their fine-tuning requires massive amounts of data.Besides, the limited number of samples raise concerns about epistemic uncertainty

OBJECTIVE

To detect COVID-19 patients using medical image such as X-Ray and CT image instead of PCR Test.To extract deep features from CT image and Chest X-Ray by popular Convolutional Neural Networks(CNN).To identify COVID-19 infected patients well in advance to curtail the spread of disease. To achieve best result, linear support vector machine learning algorithm and Neural network models are used.

PROPOSEDMETHOD

We will here apply the transfer learning approach to trainmachine learning models for COVID-19 detection. Two majorissues motivate us to solve the COVID-19 detection using atransfer learning framework:

1) training DNN/CNN modelsrequire a massive amount of data and this is not practical forCOVID-19 as the number of collected and labeled images isverylimitedandoftenintheorderofafewh undredsand

2)TrainingDNN/CNNmodelsiscomput ationallydemanding.Evenifthousandsa ndmillionsofimagesareavailable,still,it makes sensetofirstcheck theusefulness ofexisting pre-trainedmodelsfordatarepresentationand featureextraction.Themain hypothesis in the proposed framework is that there arefundamental similarities between image detection/recognitiontasksandthebinar yclassificationproblemofCOVID-19usingimages. Accordingly, learnings from the former one can besafely ported to the latter one to shorten the training process.While all five pretrained networks have been developed usingnonmedicalimages,itisreasonable toassumethattheirtransformation of X-ray and CT image pixels could make theclassificationtaskeasier.As shown in Fig. 1, the parameters of the convolutionallayers are kept frozen during the training process. The convolution layers of these five pretrained models are fed by X-rayandCTimagesforhierarchicalfeature extractions.Thefrontend of the pretrained networks is then replaced by differentmachine learning classifiers to separate Covid and non-Covidcases. It is important to mention that we drop the poolingoperation in the last convolutional layer of these pretrainednetworks. This is to avoid losing informative features beforepassingthemtotheclassificationm odels.

Any classificationstudy without reporting the predictiveuncertainty estimates is not complete. There are two types ofuncertainties, which needs to be considered for deep learningmodels[28]:

1) Aleatoricuncertaintywhichisrelatedt othenoiseinherent inthe data generating

process. This type ofuncertaintyisirreducible.

2) Epistemicuncertaintywhichcapturest heignoranceabout themodel. In contrasttoauncertainty,uncertaintyisred uciblewithcollectionofmoretrainingsam plesfromdiversescenarios [9].

Inthisarticle, wemainly focusonecertainitcloseothegeneralizatio n powerofmodelsfornew samples[29]– [31].

Here,wewilluseanensembleofdiversemo delstoobtainuncertaintiesassociatedwith made inferences [29]. An ensemble consists of several modelsdevelopedwithdifferentarchitect ures,types, and sampledsubsets. These model development differences cause diversityin the generalization power of models. Predictions obtainedfromindividualmodelsarethena ggregatedtoobtainthefinal prediction. The prediction variance could be used for thecalculationoftheepistemicuncertaint y[32].

Itisobviousthatthepredictionentropybe comeszerowhenthe output is assigned to a class with high probability andbecomes maximum when the network is uncertain about itsoutcome

(a)   (b)
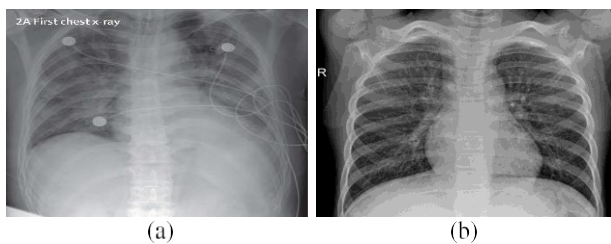
EXPERIMENTSETUP

There are two types of data sets used in this study: chestX-ray and breast CT scan. These two types of imagery datasetsare themain sources ofinformation that clinicians usefor COVID-19 diagnosis. The description of these data sets isprovided in this section. Also, statistical and machine learningclassifiers applied to process

features extracted by CNNs arebrieflyintroduced.*ChestX-RayDataSet:*Thisdatasetisformedbytaking 25images ofCOVID-19 from[34] inthefirststep.Wethenaddanother75non-CovidcasesochestX-rayimage from [35]. It is important to note that these non-Covid(normal) cases might consist of other unhealthy conditions, such as bacterial or viral infections, chronic obstructive pulmonarydisease,andevenacombination oftwoormore.Accordingly, what we mean by a normal or non-Covid casedoesnotnecessarilyinhealthylowerres piratory system.PretrainedModelsHere, we briefly introduce the four CNNs used in this studyforextractingfeatures.*VGG16[25]:*T hismodelissimilartoAlexNetandconsistsof 13convolution, nonlinear rectification, pooling,andthreefullyconnectedlayers[25] .Thefiltersizeoftheconvolutional networkis 3X andthepoolingsizeis 2X 2Duetoitssimplearchitecture,theVGGnet workisperformedbetterthanAlexNet.

The COVID-19 detection is a binary classification problemwhere the input is an image (chest X-ray or CT image) and theoutputisabinarylabelrepresentingthepr esenceorabsenceof COVID-19. Here, images are first processed by the convolutional layers of five pretrained networks. Hierarchicallyextracted features are then processed by multiple classifiers.We use eight classifiers to process features: k-nearest neighbors(kNNs),linearsupportvectormac hine(linearSVM),radialbasisfunction(RB F)SVM,Gaussian process (GP),random forest (RF), multilayer perceptron (NN), Adaboost,and Naïve Bayes.K-Nearest NeighborkNN is one of the simplest classification algorithms. It keeps a copy of all samples and classifiessamples based on a similarity measure. This similarity mea-sure isusually a kind of distance in the feature space. Themost

commonly used distance measures are Euclidean andMinkowski. In this article, we use k=2 and the Minkowskidistance metric for the classification task.GaussianProcess:Itisasrandomvariablesina waythateach setisdescribed by amultivariate normaldistribution.Thefinaldistributionof aGPisajointdistributionof all those random variables. GP uses covariance matrix anditsinversion, and thus,itwillbealazy learning algorithmin high-dimensional space. Itoutputs a distribution that notonlyestimatesthepredictionbutalsoprovidespredictionuncertainty estimates. We use RBF kernel with a length scaleequaltooneforGPclassifiersinthisstudy.Neural Network: A feedforward NN finds a nonlinearmapping between the fixed-size inputs and the output (tar-get). The network is composed of several hidden layers andprocessingunitscalledneurons.

100timesusingobtainedfeatures from pretrained CNNs. For each run, the performancemetrics are calculated, and then, the box plot graph is generated.Fig.6showstheboxplotsforCTandX-raydatasets,respectively,foraccuracy,sensitivity,andspecificity.Itisnotedthatthose values arecalculatedwithoutPCAforallclassifierstrained 100times(allfeaturespassed

(a)

(c)

toclassifiers).

ROC-AUC plots are shown for CT

(b)
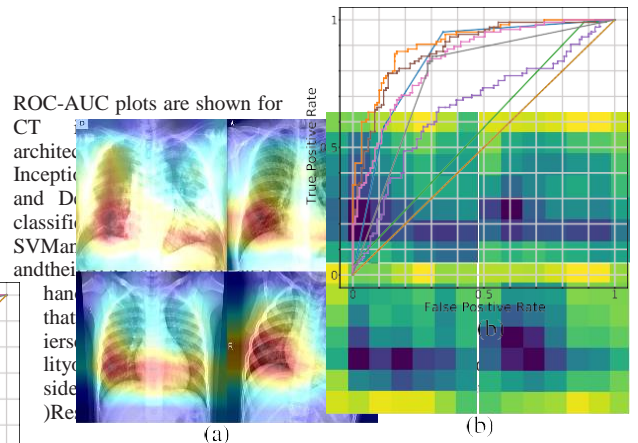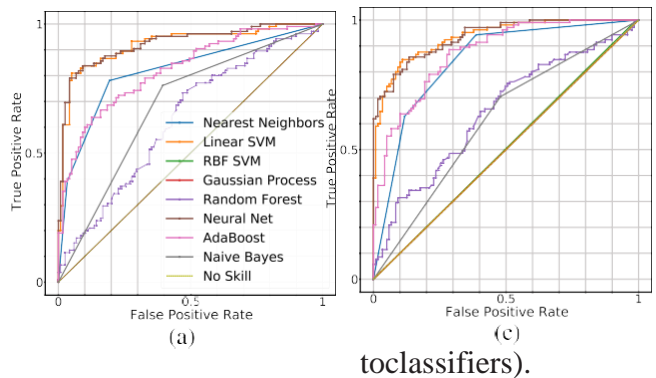
Grad-CAMsandHeatmapsshowhowourmodelmakesdecision.
(a)Grad-CAMs.(b)Heatmaps. Distributionofaccuracy,sensitivity,andspecificityassociatedwith
(a) CTand(b)X-raydatasets,respectively(thetopresultsareforCTdatasetofourdifferentclassifiers).

(d)

Accuracy, sensitivity, and specificity are considered for themodel evaluation. Purely relying on accuracy could lead tomisleading results as both data sets and in particular X-ray oneare imbalanced. For obtaining statistically valid conclusions,wetraineverysingleclassifier

ROCcurves forallpretrained CNNandclassifierrareshowing.Asexpected,linearSVMandNNmodelshavethe highestAUCvaluesamongallclassifiers. An important observation is that the

(a)

(b)
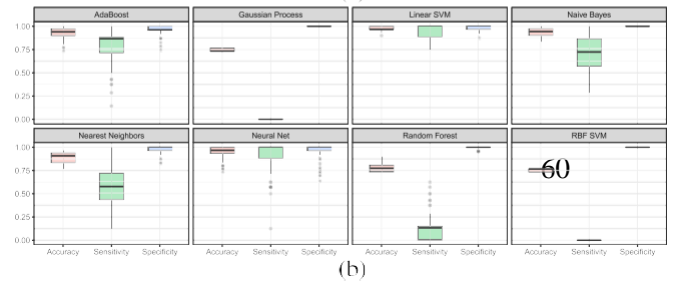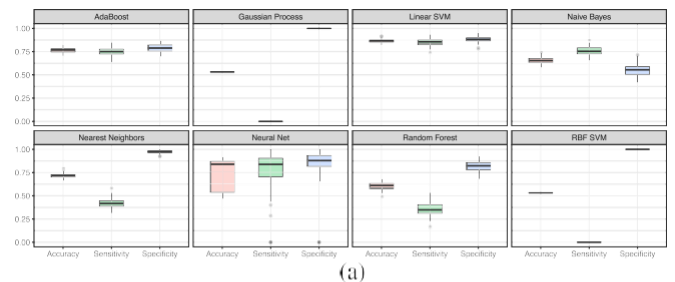
performanceofclassifierssignificantlyvariesbasedonhierarchicallyextracted features by convolutional layers of fourpretrainedCNNs.Tocomprehensively comparedifferentarchitecturesforfeatureextraction,wetrainandevaluateeachclassifier100times.Then,weaverageallprediction stoobtainareliableestimateofthesamplelabel.Then,performancemetrics, including accuracy, sensitivity, specificity, and AUCvalue, are calculated. Tables II and III report these performance metrics for CTand X-ray data setsReported valuesare given inpercent. Having compared allmodels, wefindthatnomodel outperforms othersformostcasesthan others.LinearSVMalsoachievesthebestresultsforeachmodel.Comparingthedesigned networktothatof[36],ourtransferlearning-based methodoutperforms theirs.Thebestresultsare achieved using ResNet50 and linear SVM classifier (anaccuracy of 87.9%). This is more than 3% better than the bestresults reported in [36]. (84.7% accuracy). This improvementis mainly due to a better hierarchical extraction of featuresusingResNet50andanoptimalselectionoftheclassifier(linearSVM).

It is also important to consider the network size and thenumberofdeepfeatureswhencomparing theperformanceof pretrained CNNs for COVID-19 detection. Figs. 8 and 9show the average of the classification performance (accuracyand AUC) for linear SVM and NN models in the 2-D spaceformed by the number of CNN parameters (millions) and thenumber of features (ten thousands), respectively. The size ofeach point represents the accuracy and AUC metrics of thetrainedclassifiersusingfeaturesextracte dbypretrainedCNNs.The bigger the point, the better the performance. We generatethese forlinearSVMand CNNmodels astheyarethebestperforming ones according toresultspresented.

It has the least number of parameters and extracts the smallestnumber of features. Those features are the most informativeand discriminative ones as both linear and NN models achievethebestresultsusingthem.Incontrast,themasworkof InceptionResNetV2 offers the most number of features thathave the least information content among the investigated net-work. Another key observation is the choice of the pretrainedCNN that has a direct and profound impact on the overallperformanceoftheCOVID-19classificationmodel.Lastbutnot least, one may conclude that bigger networks, such asResNet50 and InceptionResNetV2, do not necessarily extractmoreinformativeanddiscriminativ efeatures.

It is also quite important to quantify uncertainties associatedwithpredictions.Here,wegener atepredictive uncertainty estimates for NN models. As mentioned before, there are severingalwaysofgenerating ensemblenetworks.Weusetheentiredata set in the training step because the availability of moresamples improves the generalization power of NN models.Twenty individual NN models with different architectures arefirst trained to form an ensemble. NN models have a hiddenlayer and their number of hidden neurons is randomly selectedbetween50and400.
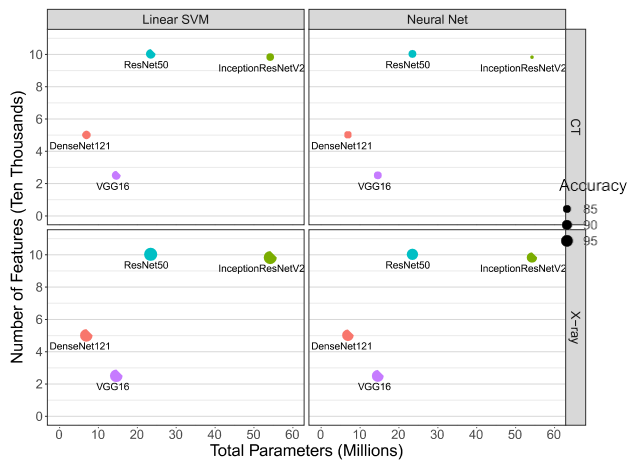
Accuracy average in the 2-D space of the number of CNN parameters(millions) and the number of features(ten thousands). The size of each pointisanindicationoftheclassifieraccuracy(meanvaluein100runs).
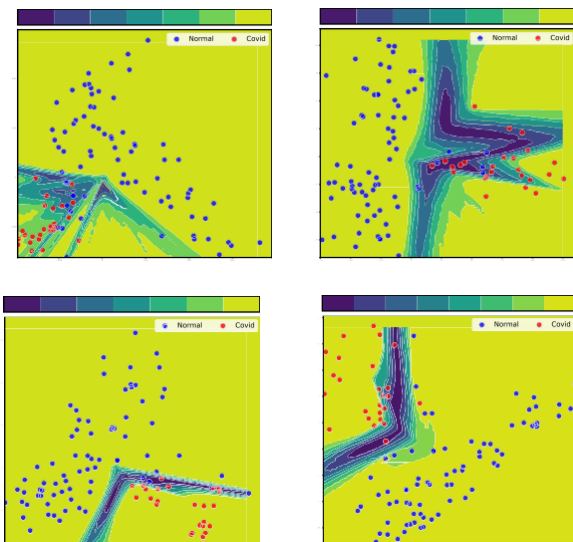
Uncertainty quantification using 20 individual neural networks working as an ensemble. They differ in the number of neurons in their hidden layerbeforeapplyingamultilayerperceptronclassifier.Thedarkerthecolor,thehighertheuncertaintylevel.Samplesondarkparts oftheplothaveahighlevelofpredictiveuncertaintyasthe20models couldnotallagreeonthepredictedlabel.(a)VGG16.(b)InceptionResNetV2.(c)ResNet50.(d)DenseNet121.
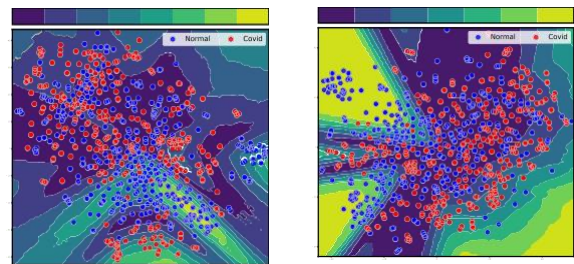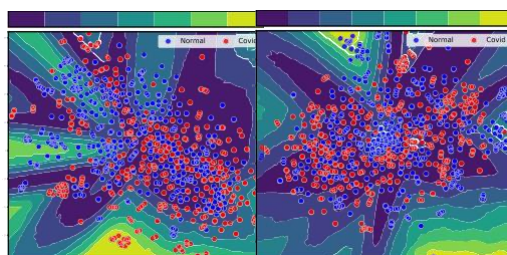
(g)

(d) VGG16.(f)InceptionResNetV2.(g)ResNet50.(h)DenseNet121.

CONCLUSION

Thepurposeofthisstudywastoinvestigate the suitabilityofdeeptransferlearningforCOVID-19diagnosisusing medical imaging. The key motivation was the lack ofaccesstolarge repositories of imagesfor developing deepneural networks from scratch. Leveraging the transfer learningframework, we apply four pretrained deep CNNs (VGG16,ResNet50, DenseNet121, and InceptionResNetV2) to hierarchically extract informative and discriminative features fromchest X-ray and CT images. The parameters of the convolutional layersare keptfrozen during thetraining process.Extractedfeaturesarethenprocessedbymultipleclassificationtechniques.ObtainedresultsindicatethatlinearSVMandmultilayer perceptron outperforms other methods in terms ofthe medical diagnosis accuracy for both X-ray and CT images.It is also observed that better prediction results and medicaldiagnosiscouldbeachievedusingC

TimagesastheyaremuchrichformationcomparedtoX-rayimages.

There are many rooms for improvement and further exploration. The performance of transfer learning algorithms couldbemajorlyimprovedbyfine-tuningthemtoextractmoreinformativeand discriminativefeatures.Featuresobtainedfrom different transferlearning modelscouldbecombinedto develop hybrid models. Also, predictions from individualmodels could be combined to form ensembles. Last but notleast,astate-of-the-artmethodcouldbeappliedformorecomprehensiveestimationoftheuncertaintymeasures.

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Artificial Intelligence **retrieval** Performance in Imaging **data capture**, Segmentation, and Diagnosis for COVID-19

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Abstract:
The pandemic of coronavirus disease 2019 (COVID-19) is spreading all over the world. Medical imaging such as X-ray and computed tomography (CT) plays an essential role in the global fight against COVID-19, whereas the recently emerging artificial intelligence (AI) technologies further strengthen the power of the imaging tools and help medical specialists. We hereby review the rapid responses in the community of medical imaging (empowered by AI) toward COVID-19. For example, AI-empowered image acquisition can significantly help automate the scanning procedure and also reshape the workflow with minimal contact to patients, providing the best protection to the imaging technicians. Also, AI can improve work efficiency by accurate delineation of infections in X-ray and CT images, facilitating subsequent quantification. Moreover, the computer-aided platforms help radiologists make clinical decisions, i.e., for disease diagnosis, tracking, and prognosis. In this review paper, we thus cover the entire pipeline of medical imaging and analysis techniques involved with COVID-19, including image acquisition, segmentation, diagnosis, and follow-up. We particularly focus on theintegration of AI with X-ray and CT, both of which are widely used in the frontline hospitals, in order to depict the latest progress of medical imaging and radiology fighting against COVID-19.

Introduction

The coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is an ongoing pandemic. The number of people infected by the virus is increasing rapidly. Up to April 9, 2020, 1,436,198 cases of COVID-19 have been reported in over 200 countries and territories, resulting in approximately 85,521 deaths (with a fatal rate of 5.95%) [1]. This has led to great public health concern in the international community, as the World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern (PHEIC) on January 30, 2020 and recognized it as a pandemic on March 11, 2020 [2], [3].

Reverse Transcription-Polymerase Chain Reaction (RT-PCR) test serves as the gold standard of confirming COVID-19 patients [4]. However, the RT-PCR assay tends to be inadequate in many areas that have been severely hit especially during early outbreak of this disease. The lab test also suffers from insufficient sensitivity, such as 71% reported in Fang *et al.* [5]. This is due to many factors, such as sample preparation and quality control [6]. In clinical practice, easily accessible imaging equipment, such as chest X-ray and thoracic CT, provide huge assistance to clinicians [7]–[8][9][10][11][12]. Particularly in China, many cases were identified as suspected of COVID-19, if characteristic manifestations in CT scans were observed [6]. The suspected patients, even

without clinical symptoms (e.g., fever and coughing), were also hospitalized or quarantined for further lab tests. Given the current sensitivity of the nucleic acid tests, many suspected patients have to be tested multiple times several days apart before reaching a confident diagnosis. Hence, the imaging findings play a critical role in constraining the viral transmission and also fighting against COVID-19.

The workflow of imaging-based diagnosis for COVID-19, taking thoracic CT as an example, includes three stages in general, i.e., 1) pre-scan preparation, 2) image acquisition, and 3) disease diagnosis. In the pre-scan preparation stage, each subject is instructed and assisted by a technician to pose on the patient bed according to a given protocol. In the image acquisition stage, CT images are acquired during a single breath-hold. The scan ranges from the apex to the lung base. Scans are done from the level of the upper thoracic inlet to the inferior level of the costophrenic angle with the optimized parameters set by the radiologist(s), based on the patient's body shape. From the acquired raw data, CT images are reconstructed and then transmitted through picture archiving and communication systems (PACS) for subsequent reading and diagnosis.

Artificial intelligence (AI), an emerging technology in the field of medical imaging, has contributed actively to fight COVID-19 [13]. Compared to the traditional imaging workflow that heavily relies on human labors, AI enables more safe, accurate and efficient imaging solutions. Recent AI-empowered applications in COVID-19 mainly include the dedicated imaging platform, the lung and infection region segmentation, the clinical assessment and diagnosis, as well as the pioneering basic and clinical research. Moreover, many commercial products have been developed, which successfully integrate

AI to combat COVID-19 and clearly demonstrate the capability of the technology. The Medical Imaging Computing Seminar (MICS),[1] a China's leading alliance of medical imaging scholars and start-up companies, organized this first online seminar on COVID-19 on February 18, 2020, which attracted more than ten thousands of visits. All the above examples show the tremendous enthusiasm cast by the public for AI-empowered progress in the medical imaging field, especially during the ongoing pandemic.

Due to the importance of AI in all the spectrum of the imaging-based analysis of COVID-19, this review aims to extensively discuss the role of medical imaging, especially empowered by AI, in fighting the COVID-19, which will inspire future practical applications and methodological research. In the following, we first introduce intelligent imaging platforms for COVID-19, and then summarize popular machine learning methods in the imaging workflow, including segmentation, diagnosis and prognosis. Several publicly available datasets are also introduced. Finally, we discuss several open problems and challenges. We expect to provide guidance for researchers and radiologists through this review. Note that we review the most related medical-imaging-based COVID-19 studies up to March 31, 2020.

SECTION II.

AI-Empowered Contactless Imaging Workflows

Healthcare practitioners are particularly vulnerable concerning the high risk of occupational viral exposure. Imaging specialists and technicians are of high priority, such that any potential contact with the virus could be under control. In addition to the personal protective equipment (PPE), one may consider dedicated imaging facilities

and workflows, which are significantly important to reduce the risks and save lives.

A. Conventional Imaging Workflow

Chest X-ray and CT are widely used in the screening and diagnosis of COVID-19 [7]–[8][9][10][11][12]. It is important to employ a contactless and automated image acquisition workflow to avoid the severe risks of infection during COVID-19 pandemic. However, the conventional imaging workflow includes inevitable contact between technicians and patients. Especially, in patient positioning, technicians first assist in posing the patient according to a given protocol, such as head-first versus feet-first, and supine versus prone in CT, followed by visually identifying the target body part location on the patient and manually adjusting the relative position and pose between the patient and the X-ray tube. This process puts the technicians in close contact with the patients, which leads to high risks of viral exposure. Thus, a contactless and automated imaging workflow is needed to minimize the contact.

B. AI-Empowered Imaging Workflow

Many modern X-ray and CT systems are equipped with cameras for patient monitoring purposes [14]–[15][16][17]. During the outbreak of COVID-19, those devices facilitate the implementation of a contactless scanning workflow. Technicians can monitor the patient from the control room via a live video stream from the camera. However, from only the overhead view of the camera, it is still challenging for the technician to determine the scanning parameters such as scan range. In this case, AI is able to automate the process [18]–[19][20][21][22][23][24][25][26] by identifying the pose and shape of the patient from the data acquired with visual sensors such as RGB, Time-of-Flight (TOF) pressure imaging [27] or thermal (FIR) cameras. Thus,

the optimal scanning parameters can be determined.

One typical scanning parameter that can be estimated with AI-empowered visual sensors is the scan range that defines the starting and ending positions of the CT scan. Scan range can be identified by detecting anatomical joints of the subject from the images. Much recent work [28]–[29][30] has focused on estimating the 2D [31]–[32][33][34][35][36] or 3D keypoint locations [29], [37]–[38][39][40] on the patient body. These keypoint locations usually include major joints such as the neck, shoulders, elbows, ankles, wrists, and knees. Wang *et al.* [41] have shown that such an automated workflow can significantly improve scanning efficiency and reduce unnecessary radiation exposure. However, such keypoints usually represent only a very sparse sampling of the full 3D mesh [42] in the 3D space (that defines the digital human body).

Other important scanning parameters can be inferred by AI, including ISO-centering. ISO-centering refers to aligning the target body region of the subject, so that the center of the target body region overlaps with the scanner ISO center and thus the overall imaging quality is optimal. Studies have shown that, with better ISO-centering, radiation dosage can be reduced while maintaining similar imaging quality [43]. In order to align the target body region to the ISO center, and given that anatomical keypoints usually represent only a very sparse sampling of the full 3D mesh in the 3D space (defining the digital human body), Georgakis *et al.* [44] propose to recover human mesh from a single monocular RGB image using a parametric human model SMPL [45]. Unlike other related studies [46], they employ a hierarchical kinematic reasoning for each kinematic chain of the patient to iteratively

refine the estimation of each anatomical keypoint to improve the system robustness to clutters and partial occlusions around the joints of the patient. Singh *et al.* [19] present a technique, using depth sensor data, to retrieve a full 3D patient mesh by fitting the depth data to a parametric human mesh model based on anatomical landmarks detected from RGB image. One recent solution proposed by Ren *et al.* [42] learns a model that can be trained just once and have the capability to be applied across multiple such applications based on dynamic multi-modal inference.

With this framework in application with an RGB-depth input sensor, even if one of the sensor modalities fails, the model above can still perform 3D patient body inference with the remaining data.

C. Applications in COVID-19

During the outbreak of COVID-19, several essential contactless imaging workflows were established[18], [41], [42], from the utilization of monitoring cameras in the scan room [14]–[15][16], [28], or on the device [47], to mobile CT platforms [18], [47]–[48][49][50] with better access to patients and flexible installation.

A notable example is an automated scanning workflow based on a mobile CT platform empowered by visual AI technologies [18], as shown in Fig. 1(a). The mobile platform is fully self-contained with an AI-based pre-scan and diagnosis system [47]. It was redesigned into a fully isolated scan room and control room. Each room has its own entrance to avoid any unnecessary interaction between technicians and patients.

(a) A mobile CT platform equiped with AI-empowered automated image acquisition workflow; (b) An example image captured by patient monitoring camera of CT system; (c)

Positioning and scanning of patient operated remotely by a technician.

Show All

After entering the scan room, the patient is instructed, by visual and audio prompts, to pose on the patient bed (Fig. 1(b)). Technicians can observe through the window and also the live video transmitted from the ceiling-mounted AI camera in the scan room, and correct the pose of the patient if necessary (Fig. 1(c)). Once the patient is deemed ready, either by the technician or the motion analysis algorithm, the patient positioning algorithm will automatically recover the 3D pose and fully-reconstructed mesh of the patient from the images captured with the camera [42]. Based on the 3D mesh, both the scan range and the 3D centerline of the target body part of the patient are estimated and converted into control signals and optimized scanning parameters for the technician to verify. If necessary, the technician can make adjustments. Once verified, the patient bed will be automatically aligned to ISO center and moved into CT gantry for scanning. After CT images are acquired, they will be processed and analyzed for screening and diagnosis purposes.

SECTION III.

AI-Aided Image Segmentation and Its Applications

Segmentation is an essential step in image processing and analysis for assessment and quantification of COVID-19. It delineates the regions of interest (ROIs), e.g., lung, lobes, bronchopulmonary segments, and infected regions or lesions, in the chest X-ray or CT images. Segmented regions could be further used to extract handcrafted or self-learned features for diagnosis and other applications. This subsection would summarize the related

segmentation works in COVID-19 and their applications.

CT provides high-quality 3D images for detecting COVID-19. To segment ROIs in CT, deep learning methods are widely used. The popular segmentation networks for COVID-19 include classic U-Net [51]–[52][53][54][55][56], UNet++ [57], [58], VB-Net [59]. Compared with CT, X-ray is more easily accessible around the world. However, due to the ribs projected onto soft tissues in 2D and thus confounding image contrast, the segmentation of X-ray images is even more challenging. Currently, there is no method developed for segmenting X-ray images for COVID-19. However, Gaal *et al.* [60] adopt an Attention-U-Net for lung segmentation in X-ray images for pneumonia, and although the research is not specified for COVID-19, the method can be applied to the diagnosis of COVID-19 and other diseases easily.

Although now there are limited segmentation works directly related to COVID-19, many papers consider segmentation as a necessary process in analyzing COVID-19. Table I summarizes representative works involving image segmentation in COVID-19 studies.

TABLE I Summary of Image Segmentation Methods in COVID-19 Applications

A. Segmentation of Lung Regions and Lesions

In terms of target ROIs, the segmentation methods in COVID-19 applications can be mainly grouped into two categories, i.e., the lung-region-oriented methods and the lung-lesion-oriented methods. The lung-region-oriented methods aim to separate lung regions, i.e., whole lung and lung lobes, from other (background) regions in CT or X-ray, which is considered as a pre-requisite step in

COVID-19 applications [51]–[52][53][54][55], [58], [59], [61]. For example, Jin *et al.* [58] propose a two-stage pipeline for screening COVID-19 in CT images, in which the whole lung region is first detected by an efficient segmentation network based on UNet++. The lung-lesion-oriented methods aim to separate lesions (or metal and motion artifacts) in the lung from lung regions [52]–[53][54][55][56][57][58][59], [61], [62]. Because the lesions or nodules could be small with a variety of shapes and textures, locating the regions of the lesions or nodules is required and has often been considered a challenging detection task. Notably, in addition to segmentation, the attention mechanism is reported as an efficient localization method in screening [60], which can be adopted in COVID-19 applications.

B. Segmentation Methods

In the literature, there have been numerous techniques for lung segmentation with different purposes [64]–[65][66][67][68]. The U-Net is a commonly used technique for segmenting both lung regions and lung lesions in COVID applications [51]–[52][53][54]. The U-Net, a type of fully convolutional network proposed by Ronneberger [69], has a U-shape architecture with symmetric encoding and decoding signal paths. The layers of the same level in two paths are connected by the shortcut connections. In this case, the network can therefore learn better visual semantics as well as detailed contextures, which is suitable for medical image segmentation.

Various U-Net and its variants have been developed, achieving reasonable segmentation results in COVID-19 applications. Çiçek *et al.* [64] propose the 3D U-Net that uses the inter-slice information by replacing the layers in conventional U-Net with a 3D version.

Milletari *et al.* [65] propose the V-Net which utilizes the residual blocks as the basic convolutional block, and optimize the network by a Dice loss. By equipping the convolutional blocks with the so-called bottleneck blocks, Shan *et al.* [59] use a VB-Net for more efficient segmentation. Zhou *et al.* [66] propose the UNet++, which is much more complex than U-Net, as the network inserts a nested convolutional structure between the encoding and decoding path. Obviously, this type of network can improve the performance of segmentation. However, it is more difficult to train. This network is also used for locating lesions in COVID-19 diagnosis [57]. Recently advanced attention mechanisms can learn the most discriminant part of the features in the network. Oktay *et al.* [68] propose an Attention U-Net that is capable of capturing fine structures in medical images, thereby suitable for segmenting lesions and lung nodules in COVID-19 applications.

Training a robust segmentation network requires sufficient labeled data. In COVID-19 image segmentation, adequate training data for segmentation tasks is often unavailable since manual delineation for lesions is labor-intensive and time-consuming. To address this, a straightforward method is to incorporate human knowledge. For example, Shan *et al.* [59] integrate human-in-the-loop strategy into the training of a VB-net based segmentation network, which involves interactivity with radiologists into the training of the network. Qi *et al.* [54] delineate the lesions in the lung using U-Net with the initial seeds given by a radiologist. Several other works used diagnostic knowledge and identified the infection regions by the attention mechanism [58]. Weakly-supervised machine learning methods are also used when the training data are insufficient for segmentation. For example, Zheng *et al.* [51] propose to use an unsupervised

method to generate pseudo segmentation masks for the images. As lacking of annotated medical images is common in lung segmentation, unsupervised and semi-supervised methods are highly demanded for COVID-19 studies.

C. Applications in COVID-19

Segmentation can be used in various COVID-19 applications, among which diagnosis is frequently reported [51], [55]–[56][57][58], [70], [71]. For example, Li *et al.* [56] use U-Net for lung segmentation in a multi-center study for distinguishing COVID-19 from community-acquired pneumonia on Chest CT. Jin *et al.* propose an AI system for fast COVID-19 diagnosis [58]. The input to the classification model is the CT slices that have been segmented by a segmentation network.

Another application of image segmentation is quantification [52]–[53][54], [59], [61], [62], which further serves for many medical applications. For example, Shan *et al.* [59] propose a VB-Net for segmentation of lung, lung lobes and lung infection, which provide accurate quantification data for medical studies, including quantitative assessment of progression in the follow-up, comprehensive prediction of severity in the enrollment, and visualization of lesion distribution using percentage of infection (POI). Cao *et al.* [52] assess longitudinal progression of COVID-19 by using voxel-level deep learning-based CT segmentation of pulmonary opacities. Huang *et al.* [53] segment lung region and GGO for quantitative evaluation, which is further used for monitoring the progression of COVID-19. Qi *et al.* segment lung lesions of COVID-19 patients using a U-Net based algorithm, and extract radiomics features for predicting hospital stay [54].

In summary, image segmentation plays an important role in COVID-19 applications, i.e., in lung delineation and lesion measurement. It facilitates radiologists in accurately identification of lung infection and prompting quantitative analysis and diagnosis of COVID-19.

SECTION IV.

AI-Assisted Differential Diagnosis of COVID-19

In outbreak areas, patients suspected of COVID-19 are in urgent need of diagnosis and proper treatment. Due to fast acquisition, X-ray and CT scans are widely performed to provide evidences for radiologists. However, medical images, especially chest CT, contain hundreds of slices, which takes a long time for the specialists to diagnose. Also, COVID-19 as a new disease has similar manifestations with various other types of pneumonia, which requires radiologists to accumulate many experiences for achieving a high diagnostic performance. Thus, AI-assisted diagnosis using medical images is highly desired. Segmentation discussed in the previous subsection could be used to preprocess the images, and here we focus on the methods that could take advantage of those segmentation results into the diagnosis. Table II lists the most relevant state-of-the-art studies in this direction.

TABLE II Related Studies With Medical Images for AI-Assisted Diagnosis of COVID-19

A. X-ray Based Screening of COVID-19

X-ray images are generally considered less sensitive than 3D chest CT images, despite being the typical first-line imaging modality used for patients under investigation of COVID-19. A recent study reported that X-ray shows normal in early or mild

disease [72]. In particular, abnormal chest radiographs are found in 69% of the patients at the initial time of admission, and in 80% of the patients sometime after during hospitalization [72].

Radiological signs include airspace opacities, ground-glass opacity (GGO), and later consolidation. Bilateral, peripheral, and lower zone predominant distributions are mostly observed (90%). Pleural effusion is rare (3%) in comparison to parenchymal abnormalities [72].

Classification of COVID-19 from other pneumonia and healthy subjects have been explored. Ghoshal et al. [73] propose a Bayesian Convolutional Neural network to estimate the diagnosis uncertainty in COVID-19 prediction. 70 lung X-ray images of patients with COVID-19 are obtained from an online COVID-19 dataset [74], and non-COVID-19 images are obtained from Kaggle's Chest X-Ray Images (Pneumonia). The experimental results show that Bayesian inference improves the detection accuracy of the standard VGG16 model from 85.7% to 92.9%. The authors further generate saliency maps to illustrate the locations focused by the deep network, to improve the understanding

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AUTOMATIC INDICATION OF MEMBRANE IN RO FILTER USING ARUDINO

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ABSTRACT:

A problem was identified in monitoring the condition of the RO membrane, which is corrupted due to many factors. But without considering those factors, the membrane could be monitored by sensing the PPM of purified water. And our kit will help us to solve that problem.

INTRODUCTION:

Membrane filter act as a barrier to separate contaminants from water, or they remove the particles contaminating the water. Reverse osmosis, ultra-filtrations and Nano filtration all use membrane in their filtration processes. The reverse osmosis membrane on average should be replaced every 3-5 years, if it is still producing good quality water you may be able to keep it longer than five years.

There are a few ways that you can determine if your membrane is still good or if it is time to replace it. The number one indicator is when the RO system simply stops producing water or the flow of the RO water is weaker than it used to be. Next, if your RO system is running constantly that is another sign that it is time to replace your membrane. The RO system will run continuously because it is unable to produce enough RO water to filler the entire system. Lastly, the quality of the RO water that comes out of your RO faucet will also tell you if it is time to replace the membrane. Water quality is measured by TDS or

Total Dissolved Solids. This is the total amount of minerals, salts or metals dissolved in a given volume of water. It will be expressed in (mg/L), also referred to as parts per million (ppm). On average the water quality for City Water is about 300 to 550 ppm, and Well Water is about 30 to 20,000 ppm. The reasoning behind the wide spectrum for Well Water is because bodies of water surrounding the Well Water makes a big difference on various PPM

The world is suffering from an eminent water crisis. Safe and pure drinking water is the necessity and right of everyone. The use of reverse osmosis-based water treatment plants has become a common method for providing clean water in many areas as the global demand for water increases. Automation and monitoring is an important task for such plants at remote distance. A system is needed to prevent difficulties when one needs to control and monitor important parameters such as Total Dissolved Solids (TDS), Water Level, Flow rate manually. Manually operated RO plants have failed due to lack of proper monitoring and maintenance. TDS or Total Dissolved Solids. This is the total amount of minerals, salts or metals dissolved in a given volume of water. It will be expressed in (mg/L), also referred to as parts per million (ppm).This system will measure the ppm value and gives the output.

OBJECTIVES:

The aim of this project is to design and construct an automatic indication of
Ro filter membrane condition using Arduino kit and TDS sensor.

* RO membrane is the most vital part of any RO water purifier.

* Timely replacement of RO filter and membranes is important for ensure 100% pure drinking water.

* The maintenance of this membrane is regular life is tough due to inbuilt nature of Membrane

* Hence, we provide a solution for monitoring that membrane in this project.

EXISTING SYSTEM:

In existing system there is only an intimating option through an alarm system, and the user doesn't know about the condition of membrane, and they don't having basic knowledge about how much PPM value of water they consuming daily, we are one step ahead to give an excellent output to them by displaying a PPM value and additionally we added temperature to the users. finally, we developed this as an external kit as usual we can fix our device as an internal device in their RO membrane of water purifier.

PROPOSED SYSTEM:

The system which was used in this project were mainly dependent on the PPM.

If TDS value is more than 250 PPM, then the water is not able to drink.

If TDS value is less than 250 PPM, then the water is good for drinking. In this system we will analyse the pp value of outlet water of RO membrane.

The value of ppm from the purified water is analysed by using TDS sensor.

The above system will be used to determine the condition of RO membrane in the water purifier.

(B) PROPOSED SYSTEM BLOCK DIAGRAM:
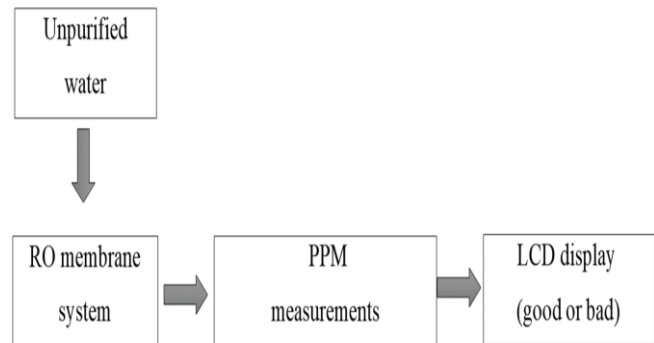
The above block diagram represents the flow of execution of system.

The value of water's PPM plays a major role in the system of execution. There are always TDS sensor to measure the value of water's PPM.

It will help us to describe the detailed calculation of the measurement of water quality.

SCOPE OF PROJECT:

A. FEATURES

- Light weighted of Kit
- Accuracy of measurements
- Protected development
- Convenient for use
- Goodness for daily life
- Runtime Speed

B. ADVANTAGES

- Available to all kind of customers.
- Reduce the time to find the defect

- Less area required for installation

Finally, this will help us to maintain and use the RO purifiers and the whole system is interactive.

OUTPUT:

The are two possible ways of outcomes during end of the result

Output 1:

When the ppm value of water is below 250. Then the LCD will show that

Membrane in good condition.

Output 2:

When the ppm value of water is above 250. Then the LCD will show that

Membrane in bad condition.

DEMO OUTPUT:

The following output will describe the good condition output.

(OUTPUT – 1)

The following output will describe the bad condition output.

(OUTPUT – 2)

CONCLUSION:

In this project we design Automatic indication of RO filter membrane condition using the arduino. To check the condition of the RO membrane whether the membrane is good or bad conditions by checking the water ppm value using TDS meter it will measure and display the condition.

Any way there is a use of this kit to the customer to understand and know about the usage of RO membrane and helped them to what kind of water they consumed

daily, they should learn the aware of the real truth of water characteristics on RO Membrane in the water purifier.

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BLOCKCHAIN BASED ENCRYTPED MESSAGE SHARING SYSTEM IN VANET USING INTERPLANETARY FILE SYSTEM

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ABSTRACT

The underlying work aims in tackling the problems faced during message transmission in conventional Vehicular Ad hoc Network (VANET) system that uses Vehicular Energy Network(VEN). VANET is a subclass of mobile ad hoc networks. The problems faced during message dissemination in the existingsystem are lack of security, less trust between users, breaching personal identities, etc., aretackled by the proposed system using blockchain. The blockchain based system provides reliability and security which lacked in previously proposed networks. The proposed system is a three-layered system consisting of the outer working layer, storage layer and blockchain layer. The integrity of messages is protected by registering all the vehicles through a Certificate Authority. This ensures that only legitimate vehicles are in the network which can guarantee the users on the network that the messages sent and received are trustable. The second layer is the storage layer which stores the data sent by vehicles and ensures minimizing storage cost and data using Artificial Intelligence based Interplanetary File System (IFPS). The hashes of the data stored in the Interplanetary File system are stored in the third layer to ensure user safety. Also, the users are given reputation scores and lightweight trustworthiness verification of vehicles are issued in this layer. All these put together the proposed work shows the efficient problem tackling feature that lacked in existing system. It also reduces the storage by 80% by storing hash of data.

INTRODUCTION

Over few years, people started migrating from rural areas to urban areas in search of basic amenities. Even though migration has brought many benefits, it has also brought some serious issues like lack of health facilities, decrease in employment opportunities, reduction in natural resources, etc. It has also created a demand for electricity having various issues like the imbalance between supply and demand, massive load shedding and blackouts, drastic increase in electricity prices, etc. To overcome the above issues, green and smart city is the only option. Smart city includes smart transportation, smart homes, smart grids, smart hospitals.

Vehicles using Vehicular Energy Networks (VENs)is the smart transportation. It consists of On-Board Units (OBUs), which assist the vehicles in communicating with the nearby vehicles (OBUs) and other infrastructure using dedicated short range communication protocol (DSRCs). There is other communication protocols as well, DSRC is used because it uses less transmission time comparatively than others and it is a fully designed protocol. In VENs, the vehicles share about road traffic, condition of roads and other important messages likeaccidents

and drastic climatic conditions. These messages are called as announcement messages. There is also a chance of internal people purposefully providing wrong information to divert the transportation. For cases like this, people inside

can see the ratings of malicious user and remove them from the network to avoid this situation. Though there are some drawbacks present in VENs like trust and security tackling, the benefits overcome those drawbacks and provide a smart transportation.

A. CONTRIBUTIONS The major contributions of the proposed work are as follows. The novelty of the work lies solely in the proposed system model, which is both unique and efficient. A vehicular announcement scheme based on BC technology is proposed where lightweight announcement sharing is ensured. Data is distributively stored in Artificial Intelligence (AI) powered Interplanetary File System (IPFS), which ensures storage cost reduction and data availability. The vehicles' reputation information and the hashes provided by the IPFS upon data storage are uploaded on Ethereum BC. • The pseudonyms are generated using Elliptic Curve Cryptography (ECC), which ensures anonymity. • A reputation-based incentive scheme is used for accidents.

SECURITY FEATURES

In this section we see how to overcome the existing security issues. Since our scheme involves BC, it brings various problems in data integrity, decentralization, prevention of SPoF, non repudiation, data availability and trust. Some of the security features are

- Data integrity and availability
- Confidentiality
- Non repudiation
- Single point of failure

A. DATA INTEGRITY AND AVAILABILITY The data are being stored in DLT. The copies are shared within all the

encouraging honest behavior of users and provisioning of true announcement ratings.
• A Cuckoo Filter (CF) is employed for validating vehicles' trustworthiness while hiding vehicles' actual reputation scores.

PROBLEM STATEMENT

The existing systems are getting obsolete with every day as many issues related to them like lack of trust, single point of failure, etc. People are shifting towards the use of latest systems. The huge shift of people from traditional means to latest means provides various benefits but also has serious threats. Moreover, the shortcomings of the traditional energy trading schemes like lack of trust, loss of privacy and security, unauthorized and harmful requests, etc., need to be addressed. In lieu of this, the authors of provide BC based solutions to tackle issues of latency, network overhead, security, and privacy. These systems ensure efficient energy trading in VENs. However, the proposed systems also come with issues like generation of many requests by EVs, which further increases the networks' computational overhead. Apart from that, the sudden increase in the number of vehicles leads to traffic jams and roadside

nodes of the network. The changes in the ledger are reflected to all the nodes in the network. The attackers will not be able to modify the data without notifying. Since the data is stored in a peer-to-peer manner, data availability is ensured.

B. CONFIDENTIALITY BC does not inherent confidentiality because the data is verified by all network participants for achieving consensus. data is encrypted before storing it on the BC to ensure confidentiality

C. NON-REPUDIATION The data stored once cannot be changed in

BC. It can only be updated in block; it will be visible to all the new partcipants. Once the transaction done by the user cannot be repudiated by the user again.

D. SINGLE POPINT OF FAILURE SPof is prevented by BC as it decentralized by technology and involves consensus between all nodes. Group of participants are maintained by BC.

DESIGN GOALS

Here the goals of the proposed work are being discussed.

A. PRIVACY Here the privacy is considered to be the fundamental requirements. The use of static pseudonyms leads to vehicles' privacy leakage issue. The identification of user is also possible by static psuedonyms. The publicly available vehicles' reputation scores are used as quasi-identifiers to perform background knowledge attack.

D. TRACEBALILITY
The CA is in possession of the data necessaryto map vehicle RIDs and PIDs. Upon their engagement in the fraudulent operations, the malicious vehicles' digital certificates are revoked by CA utilising the mapping betweenRIDs and PIDs.

E. VEHICLES' ENTHUSIASM
By offering incentives based on reputation, oursuggested approach encourages users to comment on the announcements they receive. The reputation values of the announcement sharing cars are determined using the Feedback Messages FBs that the vehicles havesent. The performance of the system is also correlated with the reputational values of the automobiles. A car's performance would be better the more reputable it is. Additionally, choosing which data to store on the IPFS is aided by the reputation scores of the cars. In comparison to data from low-

B. NON-REPUDIATION
Nonrepudiation is an important attribute of VEHs. It prevents vehicles from denying that they have sent an announcement message in the network. The computational cost and storage incurred whiledoing. So, it is not suitable

C. DATA AVAILABILITY AND STORAGE It is necessary for the distributed systems. To reduce the storage cost, the old transactionmust be deleted. Old transaction causes data loss. To tackle the data loss issue, the data are being stored in distributed storage system.

reputation vehicles, data from high-reputation vehicles isgiven more weight. This ultimately improves system performance even further.

CONCLUSION

A block chain-based system is used to ensure secure and reliable dissemination of data in the proposed model. It is a three layered system comprising message dissemination layer, storage layer and block chain layer.In the first layer where the registration of vehicles takes place through CA it becomes a part of proposed network . In the second layer, the data are stored at AI based IPFS system sent by the vehicles. In the third layer the hashes of the data stored in the IPFS. The users are awarded for providing honest reviews. Through extensive simulations, the

computational time is reduced by 15-18% and storage overhead is reduced by 80-85%, respectively when storing hash of data on the BC network as compared to storing actual data on network.

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Block chain Technology in Cyber security and Privacy

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Abstract - Blockchain Technology is defined as a decentralized system of distributed registers that are used to record data transactions on multiple computers. The reason this technology has gained popularity is that you can put any digital asset or transaction in the blocking chain, the industry does not matter. Blockchain technology has infiltrated all areas of our lives, from manufacturing to healthcare and beyond. Cybersecurity is an industry that has been significantly affected by this technology and maybe more so in the future. Blockchain for Cybersecurity and Privacy: Architectures, Challenges, and Applications is an invaluable resource to discover the Blockchain applications for cybersecurity and privacy. The purpose of this book is to improve the awareness of readers about Blockchain technology applications for cybersecurity and privacy. This book focuses on the fundamentals, architectures, and challenges of adopting the blockchain for cybersecurity. You will discover different applications of blockchain for cybersecurity in IoT and healthcare. Some case studies of the blockchain for E-Commerce Online Payment, Retention Payment System, and digital forensics. It aspires to provide a relevant reference for students, reference, engineers, and professionals working in this particular area or those interested in grasping its diverse faucets and exploring the latest advances on the blockchain for cybersecurity and privacy.

INTRODUCTION

Blockchain technology is a decentralized ledger of digital asset ownership on which the asset owners, or users, can initiate transfer to other users whose interconnected computers run blockchain software ("nodes"). The transactions themselves are encrypted transfer data that, when confirmed (in batches,

roughly every 10 minutes), comprise the "blocks" and when linked sequentially to the referenced prior block, comprise the "chain." Confirmation occurs when the first of these nodes, each of which maintains a current copy of the blockchain, verifies the transaction(s) by utilizing specialized computational software to solve a complicated encryption problem. Then, and only then, does this node add the new block sequentially into the chain, causing the other nodes to validate the solution and update their ledgers accordingly. This verification yields compensation to the problem-solving node, a "miner," for the processing power expended in first successfully confirming the transaction. Realizing this potential, global investment banks are beginning to develop public and private blockchain technology standards and protocols, with a goal of reimagining their daily operations within the global financial system. While the possibilities for financial innovation — shared ledgers and smart contracts to name a few — are dizzying, it is important to remember one thing: the speed and extent of acceptance of blockchain technology within the global financial services community will ultimately depend on the security of the network. Earlier this year, Interpol reported that blockchain can be repurposed by hackers to export malware to all computers within the network. Interpol proved this by introducing a proof-of-concept malware that showed the viability of such a cyberattack. In the event of an actual attack, blockchain's virtues, such as decentralization and immutability, would instantly become vices, as the malware would spread far and wide and the pollution would not be easily erased

.The intermediary functions described above are currently critical actions within global financial services, particularly in relation to financial asset trading; however, these activities are increasingly expensive, inefficient and, most dangerous of all,

risky. They are expensive because the information technology investment and maintenance costs are significant. They are inefficient because although trading is swift for many financial assets, settlement is not, with too much reliance on backoffice human agency and duplication of effort and systems. They are risky because settlement delay introduces counterparty risk, and data concentration on centralized servers introduces operational/systems risk. In short, they are increasingly capitalintensive activities in the post-credit crisis milieu, where despite muted trading revenue, the demands of regulators grow louder for more transparent.

PROBLEM STATEMENT

Vulnerabilities at Blockchain Endpoints

While blockchain has been touted as virtually "unhackable," it's important to remember that most blockchain transactions have endpoints that are far less secure. For example, the result of bitcoin trading or investment may be a large sum of bitcoin being deposited into a "hot wallet," or virtual savings account. These wallet accounts may not be as hacker-proof as the actual blocks within the blockchain.

To facilitate blockchain transactions, several third-party vendors may be enlisted. Some examples include payment processors, smart contracts and blockchain payment platforms. These third-party blockchain vendors often have comparatively weak security on their own apps and websites, which can leave the door open to hacking.

Scalability Issues

Today's blockchains are the largest ever built, and as the technology continues to gain in popularity, blockchains are only going to get bigger. This has caused some experts to be wary, simply because these large-scale blockchains are untested. Common concerns center around the issue that as the blockchain ecosystem grows, additional vulnerabilities may be discovered and exploited, or that the tech infrastructure that supports blockchain will become more prone to simple mistakes.

Regulation Issues

Still another blockchain security issue is the absence of clear regulatory standards. Since there's little standardization in the blockchain world, developers

have a challenging time benefitting from the mistakes of others.

Insufficient Testing

A final issue to address: While blockchain has historically been used for cryptocurrency trades, it's increasingly being used in other fields. The problem is the coding used in non-cryptocurrency applications tends to be untested and highly experimental, meaning that hackers may be able to find and exploit vulnerabilities.

How Digital Wallets Get Hacked

The vast majority of users who have funds stolen are victims of phishing attacks. An attacker will trick the user into clicking a malicious link, providing credentials or installing a trojan on their device.

The most common example is a familiar website that has a fake metamask popup which asks for a seed phrase for your wallet. The malicious website sends the seed phrase to the attacker and funds are stolen.

Another often seen attack vector is a malicious airdrop or smart contract where a user signs a transaction thinking they'll be doing one thing but in reality they approve spend of their digital assets to the malicious contract which then transfers them out of the account. Because of the obfuscation around the signing of digital transactions these can be very hard to detect.

A more complex and advanced attack may involve a targeted, spoofed email which is indistinguishable from real correspondence providing a Google docs link to a "RandomDocument.docx", this file installs a trojan when opened providing the attackers with complete control over the device. Once in the hackers can reroute metamask or hardware wallet transactions prior to signing to steal funds.

Protection:
Protecting Seed Phrases & Private Keys

When you set up a new digital wallet it will be backed up by a seed phrase which consists of 12-24 keywords.

There is **no reason you should ever need to provide your seed phrase** or private keys to any 3rd party. If a website is asking you to enter your seed

phrase it should set alarm bells ringing straight away.

The seed phrase provides complete control of your digital wallet and no one should have access to your wallet apart from yourself.

You should never store your seed phrase on your computer or any internet connected device. There is a famous case of the Bitfinex hackers who stole

Bitfinex hackers who kept the private key to 94k Bitcoin on a cloud storage account.

Best practice would be to use something like a Stainless Steel Private Key Plate and store it somewhere away from your office/home or any registered address.

Identify Fake Google Ads

Can you spot the fake Google Ad at the top of the search results? If you were in a rush would you notice?
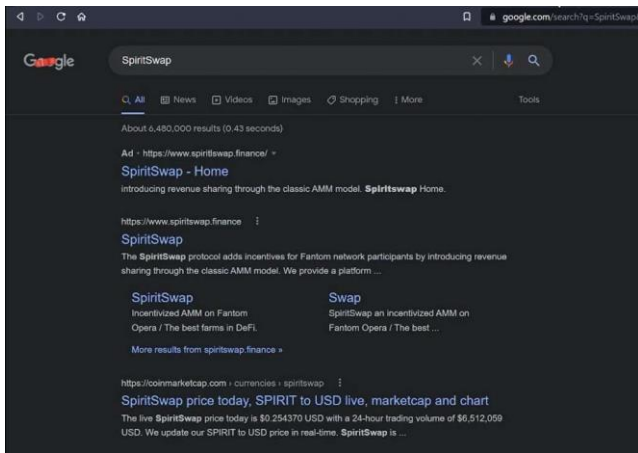
This leads to a cloned website that generates a imitation Metamask popup asking for the seed phrase to the account.

Don't Click Email Phishing Links

I receive phishing emails on a daily basis. The vast majority are bulk sent and are easy to detect. However

a well executed, personalised spear phishing email will be indistinguishable from real correspondence
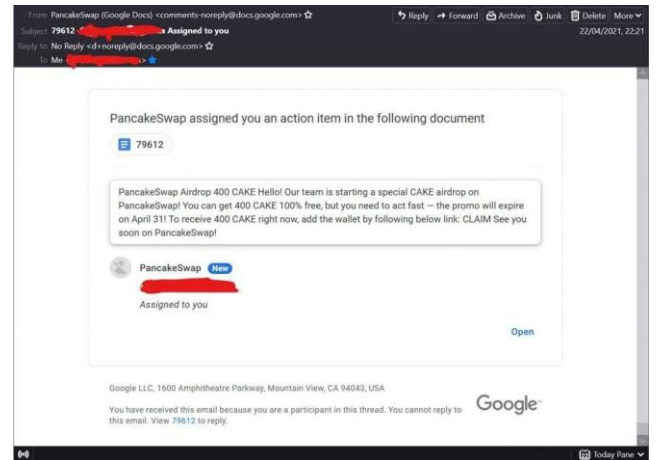
As a general rule of thumb its best not to click links in emails. You can almost always complete an action by visiting the site in question manually in a browser using a bookmarked link.

Never Open Executable Files/Documents

Below is the attack that got @Arthur_0x, a malicious .docx document which installed malware.

The attack was setup to imitate the sharing of a document by someone they were already working with. This was a targeted attack which leveraged the trust between familiar users

Review Password Security

If you keep funds on exchanges like FTX or Binance it's critical that you use good security practices. 72% of the population uses the same password or a variation of the same password for every account. When a data breach takes place those passwords get either privately or publicly shared. Linkedin, Yahoo, Zoom and many other big tech firms have suffered breaches in the past and that email:password data is available on places like RaidForums.

Your most important password is that of your primary email account. This is used to provide backup and password reset services to other accounts so it is critical to your personal security.

When writing this article I realised I hadn't changed my main email password since 2011, shame on me. It's worth going through critical accounts and updating passwords or using a password manager to make it as safe as possible.

Any accounts that hold funds should also have 2fa (Two Factor Authentication) enabled. Use the Google Authenticator or Authy app rather than SMS to prevent sim-swapping attacks. I use an old mobile phone whenever setting up 2fa codes to double scan the QR codes creating a backup.

Beware of Direct Messages

If you have ever used Telegram you'll probably be familiar with the overwhelming amount of impersonator accounts. Much like email phishing attacks most of these are bulk sent and easy to detect but a targeted attack is much harder to notice.

A user will often change one character of a username and use the same profile picture making it hard to distinguish from the real person.

General scepticism will go a long way here. Never trust people you meet on the internet. If you receive a DM from someone asking you to send funds for any reason it should raise alarm bells.

Verifying Root Domains

Phishing attacks use variations on domain names for example a email link might point to https://coinbase-verifications.com/auth

This isn't part of the coinbase.com domain and anyone can register coinbase-whatever.com and create a fake website, with a fake login to collect user credentials.

Most web browsers now do a pretty good job of highlight the root domain in the URL. Always check this matches the domain you expect to be visiting. https://auth.coinbase.com is a subdomain of the official coinbase.com property, this is fine. It's the first part of the domain that is key.

Using Multiple Wallets

Cold storage wallets are disconnected from the internet and stored offline. While the wallet is offline the funds can't be reached or stolen assuming the seed phrase isn't compromised.It's a mistake to think that cold storage and hardware wallets are a single solution to prevent hacks. At some point that wallet needs to be connected to a device to move funds and if the device is compromised the transaction could be modified prior to being signed as we saw in an earlier example.One clear benefit is it encourages the use of multiple wallets. By having the vast majority of funds safely locked away in cold storage a user can use as separate metamask wallet for everyday transactions.

If you have a close group of friends or colleagues who are crypto-savvy another option is to use a multi-signature wallet. These require a set number of signatories to sign off on a transaction before it goes through. So for example you could have three approved signers and require any two of them to sign a transaction. That way if any individual has their account compromised or loses their keys it isn't an issue.

 CONCLUSION

It's easy to read stories about NFT's and funds getting stolen and think that it's not something we would ever fall for. In truth a well crafted social engineering attack combined with a zero day exploit will catch even the most tech-savvy market participants.

We can take active measures to make it as difficult as possible for hackers to target us by having good personal security and being familiar with common attack vector

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BLUE EYES TECHNOLOGY

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**Abstract-Science cannot be evaluated in terms of development and growth. It showcases what the human intellect is capable of. iTechnology known as "blue eyes" has now been developed to be able to monitor and control human emotions and feelings through electronics. The eyes, fingers, and speech all contribute to how the human body perceives emotion. The Emotion Sensory World of Blue Eyes technology, which is used in this work, extracts the eye component from a taken image and compares it with photos that have already been saved in a database to determine human emotions (such as sadness, happiness, surprise, or exaltation). After the mood is established, songs will be played to bring back the natural range of human emotions.
Keywords: Exaltation, Experimentation, and Perception.**

I.INTRODUCTION

The term "blue" refers to both Bluetooth, which provides dependable wireless communication, and the eyes, which allow us to gather a wealth of intriguing and significant information through eye movement.Providing human powers to the computers is the fundamental concept of this Technology.Living in a society where people and computers interact.Developing computational robots with sensory and perceptive abilities similar to those of humans is the goal of Blue eye Technology. Giving the PC a human touch is the main idea behind this innovation. We all have certain perceptual abilities, so we can discern one another's affections.

For example, we can dissect a person's external appearance to understand his passionate mood.

II.BLUE EYES

The "BLUE EYES" system offers the technological tools necessary for tracking and documenting the operator's fundamental physiological data. The system monitors the user's physical movements and actions, which are accompanied by a sizable visual axis displacement (saccades larger than 15 degrees). In a complicated industrial context, the operator may be exposed to hazardous substances that could impair his circulatory, respiratory, and cardiovascular systems. The system uses a signal collected from the forehead skin surface to measure heart rate and blood oxygenation. The Blue Eyes system checks the aforementioned variables for any unusual or undesired situations (such as a prolonged period of hypoxia, for example).

Figure 1

III.VISION SYSTEM OF BLUE EYES

III.1. Multi -camera IR based eye tracking

To estimate the number of calibrated cameras, many pre-calibrated cameras are used to ascertain the user's head attitude. Using the monitored eye locations as a guide, we estimate the mouth corners for each camera. All cameras use these two mouth corners and eye positions as low-level features to estimate the user's 3D head pose. When a user moves their head inside the tracking volume, the best subsets of cameras are used for better tracking by utilising a combination of stereo triangulation, noise reduction through interpolation, and a camera switching metric. Many cameras provide 3D in addition to having a large tracking volume. However, it's possible that some cameras won't be able to detect a user's eyes as they move through the tracking volume.

III.2. Deals with infrared saturation

The tracker was first designed to function in indoor workspaces with little natural light and fluorescent lighting. The existence of almost omnidirectional infrared lighting makes tracking more challenging because there are many other infrared light sources in addition to the camera's LEDs. Because it is present throughout the day in a home interior setting, infrared light is in fact picked up by the cameras. The eye tracking sub-system used principal component analysis (PCA) to construct appearance models for the eyes. PCA is unable to account for the various contributions of noise in other variables since it equally weights each element of the feature vectors. All the changes in eyes and non-eyes illuminated by different windows and at different times of the day cannot be explained by the principal components.
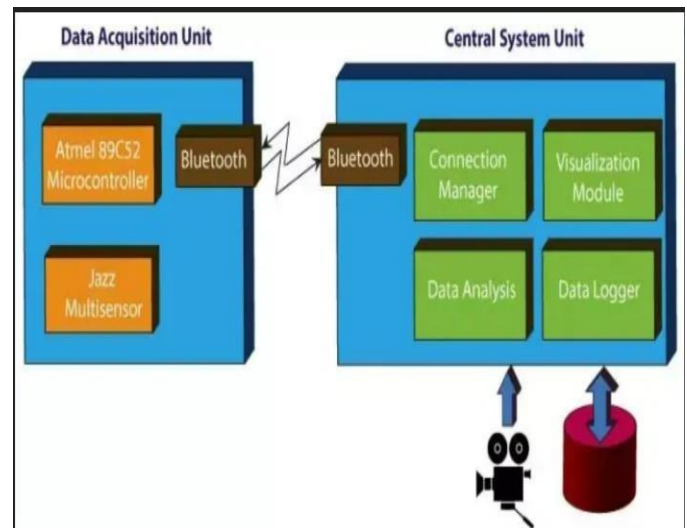
Figure 2

III.3. Head pose and software application integration

We incorporate the head posture and eye gaze estimates from the vision system as a non-intrusive user interface for the HCI applications by treating the vision system as a server. The number of eyes in the scene, the user's estimated head pose, and whether any regions of interest indicated by the application and the user's head position coincide can all be found out by applications by querying the vision system. HCI researchers can concentrate on using the data provided by our system to better effectively support user interactions by abstracting the technical aspects of the tracking by treating the vision system as a service.

IV. Applications of Blue Eyes

IV.I. Engineers at IBM's headquarters

In order to assist computers in anticipating user needs, Blue Eyes collects video data on users' facial expressions and eye movements. You might concentrate on a website's title. But it turns out that the research's first practical use is customer surveillance. The movement of the lip, brow, and pupil is tracked by Blue Eyes. The technology measures pupil size using a camera and two infrared light sources that are mounted inside the product display. One light source's focus and the other's, which is slightly off-axis, coincide. When a customer looks into the camera-aligned light and the pupil seems bright to the sensor, the software recognises their interest.

IV.II. Automobile Industry

For example, "By only touching a computer input device, such as a mouse, the computer system is claimed to be able to analyse a person's emotional condition for cars," could be used to support key judgments. I'm sorry, but I'm unable to accommodate your request to enter the fast lane. You're agitated right now, which promotes cautious driving.

V. Artificial Intelligence and Speech Recognition

It is ideal for the voice recognition system's operating environment. Some factors that may affect the quality of speech include the speaker's grammar that the system recognises, the level and type of noise, the location of the microphone, and the speed and manner in which the user talks. When you dial any phone number of a big organisation, you'll probably get the grandiose voice of a cultured woman who graciously welcomes you to company X. Give me the desired extension number, please. Your name, your extension number, and the name of the person you wish to speak with are all stated.

VI. The Technology

Two key ideas underlie artificial intelligence (AI). The first is that it contains studies on human thought processes. Additionally, the second factor is machine representations of such processes (like computers or robots). Artificial intelligence (AI) is the behaviour of a machine that carries out tasks in a manner similar to human intellect. Computers become more valuable and affordable than ever thanks to the natural intelligence that makes them smarter. Natural language processing (NLP), one of the artificial intelligence techniques, facilitates communication with a computer using a human language like English. The action is started when the input has been processed by NLP software. The input words are scanned and compared to internal databases of terms that have been recognised.

VII. Related Works

VII.I. Emotion Computing

Rosalind Picard discusses how important emotions are to the computer industry (1997). The ability to recognise emotions and the ability to express feelings are both parts of affective computing. Emotion identification is a crucial initial step in developing a flexible computer system.

The ability to recognise an individual's emotional state is provided by a computer system that can adapt and learn. According to study, people with complementary or similar personalities get along well (Dryer & Horowitz, 1997). People feel that their computer has a personality, according Dryer's research (1999). It is essential to design computers that work correctly for their users.

VII.II. Facial Expression

The face expressions of the six main emotions The physiological changes related to the impacts were measured when each subject made these facial expressions. Rate, body temperature, and general physical activity were measured using GSR and cardiac data (GSA). After then, these data were subjected to two analyses.

The analysis used the multidimensional scaling (MDS) approach to determine the dimensionality of the data. In the second analysis, dimensioned model discriminant function analysis was used to identify the mathematical traits that would distinguish the six emotional states from one another. This analysis revealed a four-state model that included the physiological differences and commonalities of the six emotional states. According to this analysis, each of the four physiological factors contributed significantly and in a special way to the processes that differentiated the six moods.

VII.III. Magic Pointing

For computers, gaze tracking has been seen as an alternative or even superior pointing method. We believe that there are many basic limitations to traditional gaze guiding. In particular, overloading a perceptual channel—for example, using eyesight while doing a motor task—is not natural. We therefore propose a different approach termed MAGIC (Manual and (Gaze Input Cascaded) pointing), which gives the user the impression that pointing is a manual activity used for fine selection and manipulation. It does, however, cancel a significant portion of the movement target-encompassing eye-gazing zone when the pointer is twisted to the right. The two different MAGIC pointing techniques are cautious and forceful.
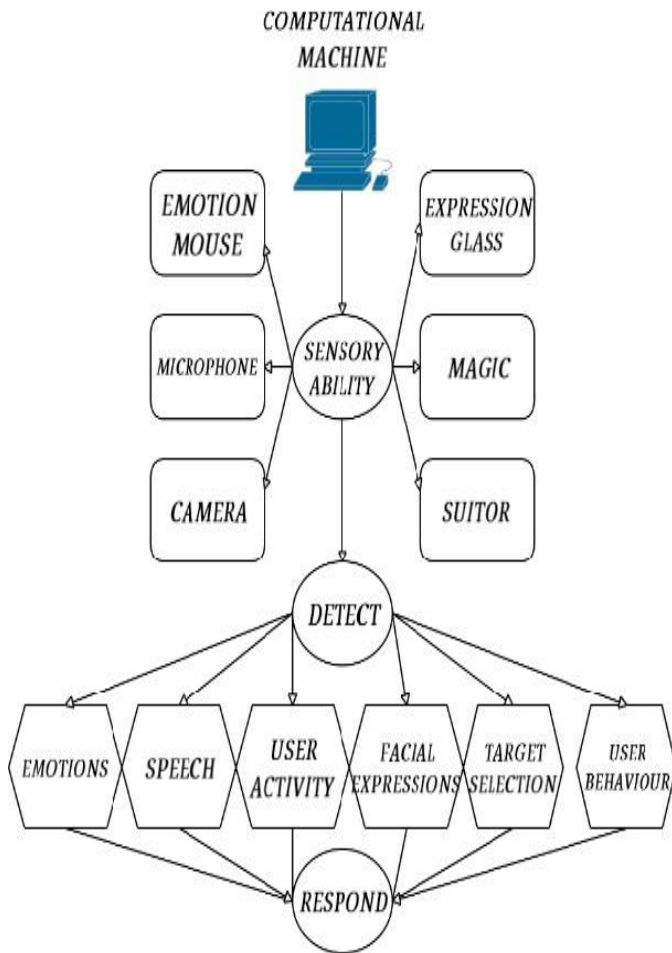
VIII. Blue Eye Technology Advantages

The Blue Eyes system offers technological tools for observing and documenting the physiological state of human.

1. The ability to perform numerous tasks at once is one of the speech recognition system's key benefits. such that the user can focus on observation and manual labour while maintaining voice input command control over machinery. One such important area where voice processing is used is in military operations. One illustration is the voice control of weaponry.

2. Pilots may communicate with the computers by speaking into their microphones using effective voice recognition technology, eliminating the need for them to use their hands.

3. Another fantastic example is a radiologist reviewing hundreds of X-rays, ultrasonograms, and CT scans while simultaneously dictating conclusions to a speech recognition system connected to word processors.

4. Computer voice recognition could be used for bookings at hotels and airlines. To make a reservation, cancel a reservation, or request information about the schedule, only the user's requirements must be specified. We offer defences against.

5. It brought about a loss of money, ecological effects, and a hazard to eye. The technical tools for observing and documenting the physiological state of a human operator are provided by the Blue Eyes system. e operator's voice, and physiological information are all recorded.

6. The goal of the blue eyes technology is to provide a computer with human strength or talents so that the machine may organically connect with people in the same ways that people interact with one another—through voice, gestures, and facial expressions.

7. The primary function of Blue Eyes software is to monitor the physiological state of working operators. The programme provides real-time physiological data processing, real-time physiological data buffering, and real-time alarm triggering to ensure immediate responsiveness to an operator's condition change.

IX. Implications - Blue Eyes

The average person cannot afford it in most cases. This technology can be evaluated by knowledgeable individuals. Both the method and the price are weighty. Utilizing several blue-eyed technology products, such as expression glasses and eye trackers, has numerous health risks. It's incredibly unreliable and encourages technology addiction.

X. CONCLUSION

The BLUE EYES technology ensures a practical approach to simplifying life by introducing more

delicate and user-friendly features into computer equipment. Now that the procedure has been verified, the hardware must be improved. Instead of using complex modules to gather user data, it will be preferable to use smaller, simpler ones. It is shown how well our system can track a user's head position across numerous cameras in a small area. In varied lighting conditions, many users might be able to execute the tracking pretty efficiently. A framework is also given for seamlessly integrating vision-based systems with application prototypes. Higher-level user behaviour assumptions are made. They improve human living by providing more luxurious and user-friendly services on computing devices.

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CLASSIFICATION OF DIABETIC RETINOPATHY USING MACHINE LEARNING ALGORITHMS

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Abstract **- Diabetic retinopathy (DR) can be categorized on the basis of prolonged complication in the retinal blood vessels which may lead to severe blindness. Early-stage prediction and diagnosis of DR requires regular eye examination to reduce the complications causing vision loss. DR disease identification and its grading by the means of transfer learning approach using Inceptionv3 model. Inception v3 model is an image recognition model that shows accuracy greater than 76.4% on the ImageNet dataset Our proposed approach utilizes deep neural network for feature extraction from fundus images and these features are further optimised with attention color channel separation model for prediction.The use of auxiliary classifier to increase the convergence of prediction. The generalization ability of the proposed model is established by the performance assessment using QUADAS 2.The optimized FTL model outperforms other classification algorithms and provides the maximum accuracy improvement of 90.3% over the state-of-the-art techniques.**

Keywords: Diabetic retinopathy, Deep neural network, Convolution neural network, Transfer Learning

I.INTRODUCTION

Blindness in young adults is caused by diabetic retinopathy (DR) all over the world. Early detection allows for promptly and efficiently treatment of DR patients and can halt the condition's deterioration. More than 25% of diabetic patients suffer from chronic visual impairment, and they are at a high probability of developing other eye-related issues. According to the WHO review, 10% of patients have true visual impairments, and 2% become blind following 15 years of undiagnosed diabetes.

Before reaching the most severe DR stage that results in neovascularization, the DR condition causes red (microaneurysms (MAs) and haemorrhages (HMs)) and yellow (exudates (EXs) and cotton wools (CWs)) lesions [2]. The stages of DR evolve from mild non-proliferative DR (NPDR) to moderate, severe (NPDR), and proliferative DR (PDR) stages in the absence of early stage diagnosis and therapy. Normal retina and retina affected by DR with multiple lesions.

So, for a disease prognosis, early and accurate DR screening is necessary. Traditional manual detection work, however, is time-consuming and susceptible to patient misinterpretation. To resolve this concern, we propose a

Prominent based Transfer Learning (TL) using Inception v3 model with attention color channel separation model is implemented for predict the diabetic retinopathy at early stages.Extraction of features and prediction accuracy of the system is high when compared with existing systems for referable DR detection during training and leverages use of unannotated retinal images

2.CONVOLUTIONAL NEURAL NETWORK

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm that can take in an input image, give various components and objects in the image importance (learnable weights and biases), and be capable of distinguishing amongst them. Objectively speaking, a ConvNet requires much less pre-processing than other classification models. ConvNets have the capacity to learn these filters and attributes, whereas in primitive approaches filters are hand-engineered.

The i-th layer of a convolutional neural network is made up of the convolutional layer and the pooling layer. The number of these layers may be extended to acquire even more intricate details, but doing so will require more computer power based on how intricate the images are.
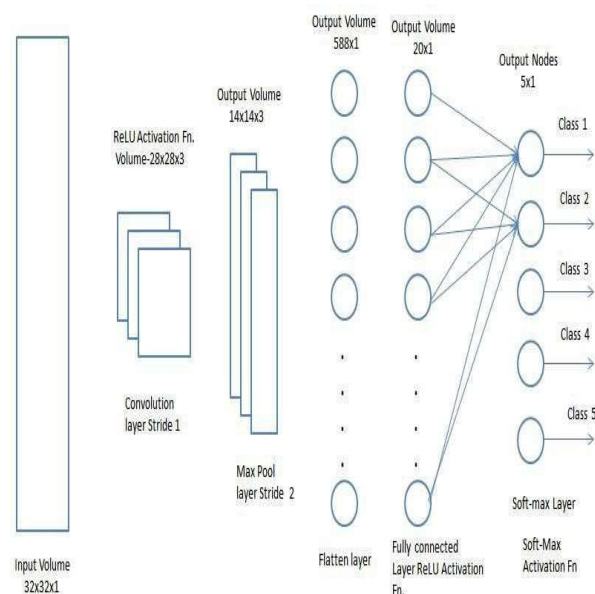

Fig.1 Convolutional Neural Network

A relatively affordable technique for learning non-

linear configurations of the high-level features represented by the output of the convolutional layer is to add a Fully-Connected layer. In that zone, the Fully-Connected layer is now learning a function that could not be linear.

We would then flatten the input image into a column vector after turning it to a representation that is compatible for our multi-level perceptron. A feed-forward neural network receives the flattened output, and backpropagation is used for each training iteration. The model can classifies images using the Softmax Classification approach across a number of epochs by detecting dominant and specific low-level features.

3. LITERATURE SURVEY

Addressing the automatic detection of diabetic retinopathy, a number of works which have been reported in the literature. The first one uses traditional machine-learning algorithms, where we need to apply external feature extraction methods based on image processing, while the second one uses deep learning to detect diabetic retinopathy where feature extraction is instantly done.

Pratt et al. [11] proposed convolutional neural network-based diabetic retinopathy detection system. They have used 13 CNN layers. They applied data augmentation techniques for handling data imbalance problem. They trained on 80,000 images of train data and reported 95% sensitivity on 5000 images of test data of EyePACS DR dataset.
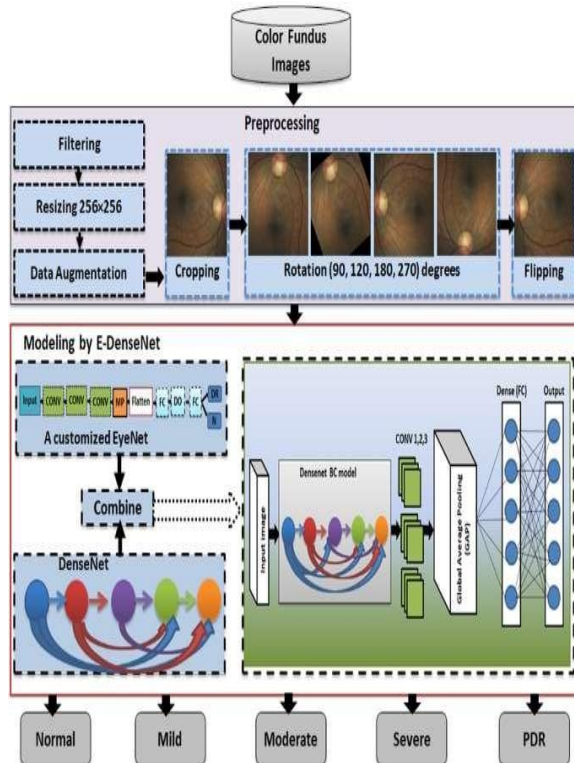
Fig.2 Classification of Diabetic Retinopathy Using an Ensemble Learning Algorithm

A CNN ensemble-based framework to detect and classify the DR's different stages in color fundus images. We used the largest publicly available dataset of fundus images (Kaggle dataset) to train and evaluate our model. The results show that the proposed ensemble model performs

better than other state-of-the-art methods and is also able to detect all the stages of DR.

Retinal image classification was done using residual neural network by Rufaida et al. [12].They developed an end-to-end framework using the EyePACS DR dataset. Quadratic weighted kappa (QWK) extraction is the evaluation statistic used to assess the performance of the model.

4. DATA AUGMENTATION

An object can be evaluated by a convolutional neural network even if it is placed in a distant region due to its invariant attribute. CNN is independent of its size, translation, and view, lighting, or any mix of the three. Essentially, this is a prerequisite for data enhancement We might possess a database of information photos in the physical realm in a small setting. Data augmentation will be indispensable since future data may have different views is required to create a realistic model.

The retinal dystrophy dataset is an imbalanced dataset with far less photos. If information is incomplete, there is a strong probability of over fitting. Hence, we shall leverage data augmentation techniques to enhance our data. For data enhancement, we have employed the techniques of horizontal flipping, rotation, zoom, width shift, height shift, and vertical flipping.

5. VGG16 ARCHITECTURE

The pooling layer is connected to the 13 Convolutional layers, three connected layers, and three fully connected layers that form the VGG16 network. The network model of VGG16 is displayed in Table 2. Numerous studies have found that the target features are obtained at each stage of the VGG16 algorithm, and that this increases with the number of layers.

The following are the main features in the designing the model part is to be considered

i.   Build dataset using Fundus images(taking pictures of an eye's iris).
ii.   Data process (including validation, sorting, classification, organization and transformation of data and prevention of overfitting).
iii. A transfer learning (i.e., fine-tuning of the developed neural network model) of the VGG 16 is used to develop the classifier.

The image is passed through a series of convolutional (conv) layers, with filters of 3×3 receptive fields, followed by a block of three fully connected layers.The conv layers can process inputs of varying sizes. It slides the input with a stack of kernels and produces an output feature map, V $\in \beta^{a*d}$

$$V = f_{VGG16}(I) \ (1)$$

where $f_{VGG16}(I)$ (1)is the VGG16 [29] network, which performs a series of convolutions and poolings to compute the features map. The feature map maintains the receptive fields responses spatially.
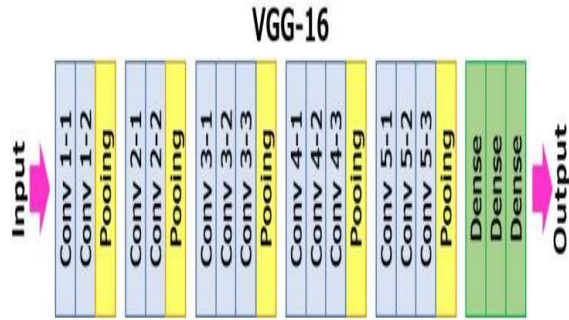
VGG-16

The Architecture

The architecture depicted below is VGG16.
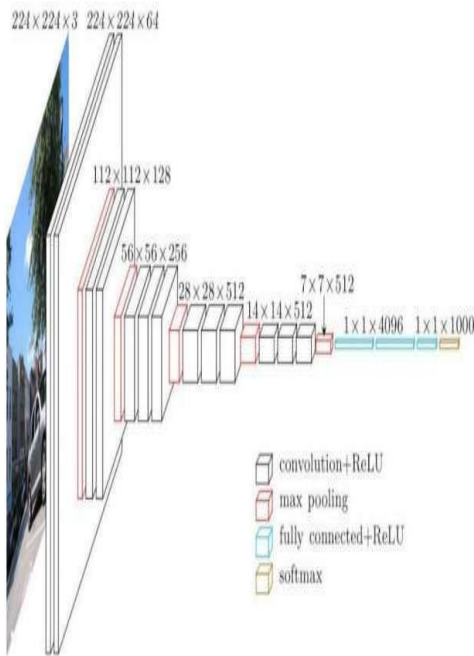
ARCHIECTURAL DESIGN FOR PROPOSED SYSTEM
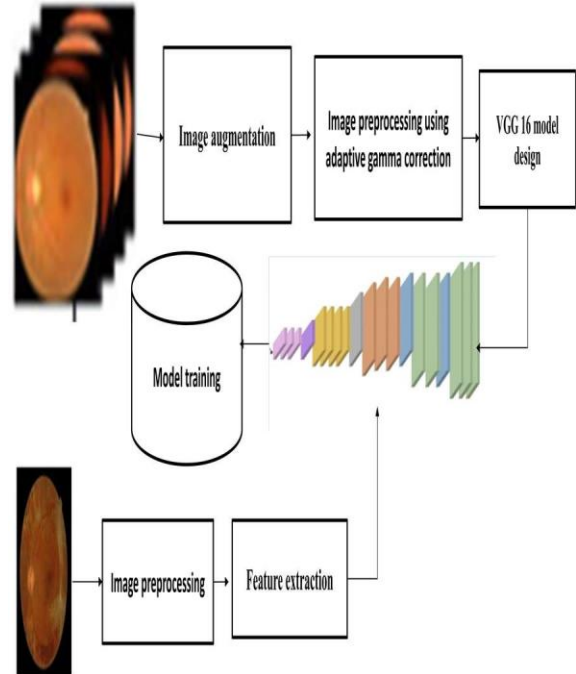
We applied preprocessing first. Then, we converted the image of different sizes to 299 × 299 RGB scale as it is default input size for Inception-VGG16 model. We performed data augmentation using Image Data Generator library of Keras framework. We have utilized 3×3, 5×5, 7×7, and 9×9 filter size for custom inception block. We trained model using Stochastic Gradient Descent Algorithms, dropout rate 0.2, batch size of 30, and the number of epochs 200

6. MODEL DESIGN

Both the APTOS 2019 blindness detection (Kaggle dataset) and the Messidor-1 dataset were used [5, 6]. They have images with diverse pixel sizes. CNN cannot take input of different dimensions, hence we wish to provide images of the same size. Therefore, we must first preprocess the image and scale it appropriately. As shown in Fig. 2, we have applied various preprocessing steps: blurring, acquiring bounding box coordinates, cropping, and resizing. Bounding box aids in estimating the dimension of the image and removes extraneous supplemental information. It is generated using the preceding methods.

		External	Validation	Set
Observer B			Observer A	
	No DR	Mild NPDR	Mod NPDR	Severe NPDR
No DR	538	10	o	0
Mild NPDR	6	214	8	2
Mod NPDR	1	o	329	5
Severe NPDR	0	o	10	50
PDR	o	o	o	o
Total	545	224	347	57

7. EXPERIMENTAL RESULT

7.1 Training Result

After the training of the dataset ,classification accuracy of this joint network reached 91.73% in the training and reached 93.14% in the testing stage. To verify this classification accuracy, we compared 2 Dimensional CNN and LSTM network, and the result shows higher classification accuracy than the previous network model.

8. PERFORMANCE EVALUATION
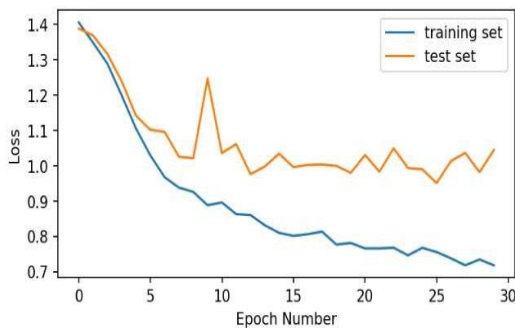
Fig.4,Accuracy Variation

In the above figure 4, it shows accuracy and loss variation results after 100 epochs. Blue color indicates curve changing of the training set and red color indicates testing set. The classification of joint networks has a higher accuracy recognition rate and less loss variation when compared with traditional neural network methods. Therefore, inception v3 model have better prediction accuracy in detecting the severity range.

7.CONCLUSION

In this work, a newly proposed architecture was introduced with usage of inception v3 model and applied to preserve people from going blind, DR must be identified early on. We presented a deep transfer learning-based technique to characterize individuals with no DR, moderate DR, mild DR, proliferative DR, and severe DR using the Diabetic Retinopathy (DR) dataset. To observe DR level severity categorization, we compared two pretrained models, VGG16 and Inception v3, based on various optimizers and activation functions. In addition to correcting the dataset's inherently unfair classes, it is necessary to enhance the least categorized photos. Fundus pictures can be employed in the proposed work to identify DR in five stages, which may be useful to ophthalmologists. Other deep convolutional networks that have already been built can be utilized in the future to investigate the efficacy of DR classification employing small training data.

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CLOUD COMPUTING IN BANKING SECTOR

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ABSTRACT – This Distributed computing is perhaps of the most impressive development that has snatched the interest of technologists from one side of the planet to the other. Distributed computing enjoys many benefits, yet it likewise has a huge number of Safety takes a chance with that no association can easily overlook. For the effective reception of Distributed computing in an enterprise, legitimate preparation and familiarity with arising gambles, dangers, weaknesses, and potential arrangements are fundamental. Subsequently, deciding the best answer for increment cloud security has become significant for all cloud tasks.

In view of a writing survey, we are researching and evaluating the main organization security and information security gambles on cloud frameworks in this study, because numerous organizations have advanced and showcased virtual conditions as the answer for flow security concerns, a more profound look finds that virtualization adds additional product to the organization framework, which might impact security whenever constructed and sent ineffectively.

Moreover, server farm centers interface their servers through programming, and that really intends that assuming something turns out badly, the last impact may be harming to security. This article looks at a few distributed computing applications in banking and online business as well as the security issues related with them.

INTRODUCTION

The objective of "Cloud Computing in banking sector" is that a new idea being investigated by several banks and financial businesses is cloud computing, one of the fastest-growing phenomena on the internet. Multiple computers connected to the internet or through any other real-time communication network make up the intriguing concept of cloud computing. A program can run simultaneously on all of the connected computer thanks to this idea. Large banks and many other financial sectors can anticipate numerous tremendous gains from cloud computing. Here are some excellent advantages of cloud computing for banks and the financial sector.

We've learned in recent years that the cloud is a crucial new tool for practically every area of our personal and professional life. Every day, more and more people utilize cloud-based note-taking, calendaring, document storage, and email services, perhaps even unaware that their data is stored in the cloud.

As a result of decreased development and maintenance costs for the applications they use on a daily basis, businesses have begun to enjoy cloud alternatives. But banks have never been very open to this kind of computation. They claimed that this was mostly due to the fact that few cloud solutions could guarantee the uptime criteria for their most service

CLOUD COMPUTING

Cloud is a type of computing which will allow multiple computers to connect to the server and run applications and services using server's resources. It is a modern type of distributed computing. The biggest benefit of cloud computing is scalability. This means a company using external cloud can add and remove resources to and from their system according to their needs. From a cloud service provider's perspective, this means his resources can be reallocated to multiple users in different times. For example, if any organization utilizes cloud's assets as their exchange handling framework during daytime, the other organization can involve it for their information examination short-term.

Applications in the cloud can be gotten to by means of internet browser, dainty clients or cell phones in light of the fact that the information (programming, stage and framework) is put away on equipment at a distant area.

Cloud can be isolated to some of numerous levels, contingent upon the degree of administration
   • **SaaS** (Programming as-a-Administration)
   • **PaaS** (Stage as-a-Administration)
   • **IaaS** (Foundation as-a-administration)

CLOUD COMPUTING IN BANKING

Cloud computing can help financial institutions improve performance in a number of ways.

A. Cost savings and usage-based billing

With distributed computing, monetary establishments can turn an enormous direct front capital use into a more modest, progressing functional cost. There is no requirement for weighty interests in new equipment furthermore, programming. Likewise, the extraordinary idea of distributed computing permits monetary establishments to single out the administrations required.

B. Business continuity

With distributed computing, the supplier is answerable for dealing with the innovation. Monetary firms can acquire a more significant level of information security, adaptation to internal failure, and debacle recuperation. Cloud registering likewise gives an elevated degree of overt repetitiveness and back-up at lower cost than convention arrangements.

C. Business Agility and Focus

The adaptability of cloud-based working models lets monetary establishments experience more limited advancement cycles for new items. This supports a quicker and more productive reaction to the requirements of banking clients. Since the cloud is accessible on demand, less foundation ventures are required, saving introductory set-up time. Distributed computing likewise permits new item improvement to push ahead without capital venture. Cloud processing likewise permits organizations to move non-basic administrations to the cloud, including programming patches, support, and other registering issues.

D. Green IT

Associations can utilize distributed computing to move their administrations to a virtual climate that decreases the energy utilization and carbon impression that comes from setting up a actual framework. It additionally prompts more productive usage of registering power and less inactive time.

SCOPE

The usage of cloud computing gives bankers the chance to communicate with their customers directly. Through cloud computing, digital services preserve consumer relationships wherever they are and at any time. The internet has made it simpler for both bankers and customers to store, manage, and retrieve information, among other services.

The development of cloud computing has allowed banks to concentrate more on adopting a customer-centric strategy and digitalizing trade and wealth management. With every part of the service, cloud computing develops a multichannel interaction with the clients. It assists with the company's massive data storage, backup, and recovery.

Through cloud computing, it is relatively simple to perform a number of different tasks, including providing software, transferring data, updating data, and recovering data. Any type of data can be stored indefinitely on the cloud. The data is kept in a variety of data storage formats. For backup and restore purposes, these data might be kept in the cloud. Through the use of cloud computing, businesses can spend less money on hardware improvements.

ADVANTAGES

- **Flexibility:** There is a high rate of flexibility.

- **Low Cost**: Companies can save big by employing cloud computing as it eliminates cost for hardware and software.

- **Speed & Scales**: Traditional methods to buy and configure hardware and software are time consuming.

- **Easier Management of Data and Information:** Since all data are located on a centralized location, data are more organized making it easy to manage.

- **Device Diversity**: We can access our applications and data anywhere in the world, on any system.

- **Back up and restore data**: When the information is put away in the cloud, it is more straightforward to get back-up and re-establish that information utilizing the cloud.

- **Improved Collaboration**: cloud applications further develop cooperation by permitting gatherings to rapidly and effectively share data in the cloud by means of shared stockpiling.

- **Unlimited storage capacity**: Cloud offers us a colossal measure of putting away limit with respect to putting away our significant information like reports, pictures, sound, video, and so forth in one spot.

- **Mobility**: Distributed computing permits us to effectively get to all cloud information through versatile.

- **Data security:** Information security is one of the greatest benefits of distributed computing. Cloud offers many high-level elements connected with security and guarantees that information is safely put away and taken care of the process.

DISADVANTAGES

- **Dependency**: One major disadvantages of cloud computing is user's dependency on the provider.

- **Risk:** Cloud computing services means taking services from remote servers.

- **Requires a Constant internet connection:** The most obvious disadvantage is that Cloud computing completely relies on network connections.

- **Security:** Security and privacy are the biggest concerns about cloud computing**.**

- **Migration Issue:** Migration problem is also a big concern about cloud computing

- **Internet Connectivity:** As you most likely are aware, in distributed computing, each datum is put away on the cloud, and we access these Information through the cloud by utilizing the web association. In the event that you don't have great web availability, you can't get to these Information. In any case, we have no some other method for getting to information from the cloud.

- **Limited Control:** As we probably are aware, cloud foundation is totally possessed, made due, and observed by the specialist co-op, so the cloud clients have less command over the capability and execution of administrations inside a cloud framework.

- **Security:** Despite the fact that cloud specialist co-ops execute the best security norms to store significant data. Yet, prior to taking on cloud innovation, you ought to know that you will send all your association's delicate data to an outsider, i.e., a distributed computing specialist co-op. While sending the information on the cloud, there might be an opportunity that your association's data is hacked by Programmers.

- **Vendor lock-in:** As various merchants give various stages, that can cause trouble moving starting with one cloud then onto the next.

CHALLENGES IN CLOUD COMPUTING

Security and Protection of data is the greatest test to distributed computing. Security and protection issues can be overwhelmed by utilizing encryption, security equipment and security applications.

This is one more test to distributed computing that applications ought to effortlessly be relocated starting with one cloud supplier then onto the next. There should not be seller secure. Nonetheless, it isn't yet made imaginable in light of the fact that every one of the cloud supplier involves different standard dialects for their foundation.

It implies the application on one stage ought to have the option to integrate administrations from different stages. It is made conceivable through web administration, however it is exceptionally mind boggling to foster such web administrations.

It is vital for cloud frameworks to be solid and hearty in light of the fact that a large portion of the organizations are presently becoming reliant upon administrations given by outsider.

Cost Management

Even as almost all cloud service providers have a "Pay as You Go" model, which reduces the overall cost of the resources being used, there are times when there are huge costs incurred to the enterprise using cloud computing. When there is under optimization of the resources, let's say that the servers are not being used to their full potential, add up to the hidden costs. If there is a degraded application performance or sudden spikes or

overages in the usage, it adds up to the overall cost. Unused resources are one of the other main reasons why the costs go up. If you turn on the services or an instance of cloud and forget to turn it off during the weekend or when there is no current use of it, it will increase the cost without even using the resources.

Execution Difficulties

Execution is a significant variable while considering cloud-based arrangements. On the off chance that the presentation of the cloud isn't palatable, it can drive away clients and reduction benefits. Indeed, even a little idleness while stacking an application or a site page can bring about a gigantic drop in the level of clients. This inertness can be a result of wasteful burden adjusting, and that implies that the server can't productively part the approaching traffic in order to give the best client experience. Challenges likewise emerge on account of adaptation to non-critical failure, and that implies the activities go on as required in any event, when at least one of the parts come up short.

Absence of Information and Aptitude

Because of the intricate nature and the popularity for research working with the cloud frequently turns out to be a profoundly drawn-out task. It requires tremendous information and wide ability regarding the matter. Despite the fact that there are a ton of experts in the field they need to refresh themselves continually. Distributed computing is a generously compensated work because of the broad hole among request and supply. There are a ton of opening yet not very many skilled cloud specialists, designers, and experts. Hence, there is a requirement for upskilling so these experts can effectively comprehend, oversee and foster cloud-based applications with least issues and most extreme dependability.

Information Security and Protection

Information security is a main pressing issue while changing to distributed computing. Client or authoritative information put away in the cloud is basic and private. Regardless of whether the cloud specialist co-op guarantees information uprightness, it is your obligation to do client validation and approval, character

the executives, information encryption, and access control. Security issues on the cloud incorporate fraud, information breaks, malware diseases, and significantly more which in the end decline the trust among the clients of your applications. This can prompt possible misfortune in income close by notoriety and height.

IMPACTS

The Large Information Upheaval that has grabbed hold lately is presently making ventures all over the planet work on their ability to access and mine information from a wide range of sources. In doing as such, existing data innovation (IT) framework is currently being put under extreme strain, while progressively imaginative computerized arrangements keep on being looked for, not least in the financial area. Also, among the area's most ground breaking computerized arrangements is distributed computing.

The cloud is ending up a better choice than support ability to deal with information, and is currently giving an unparalleled degree of readiness, security and versatility to banks. For use cases, for example, information examination, cluster handling and information stockpiling, banks can get to the cloud as and when required, and that implies they can use such assets all the more deftly and proficiently.

Distributed computing is additionally empowering monetary organizations to accomplish significant increases in effectiveness and decreases in costs, as the innovation expects banks to pay for just the administrations they use. At last, this actually intends that for testing new applications, it is considerably more practical to do as such on the cloud than on existing IT foundation.

Agile innovation

Getting to the cloud can build banks' capacity to develop "by improving deftness, proficiency and efficiency". It can likewise assist saves money with redistributing assets from the organization of IT foundation, and towards development and quick conveyance of items and administrations to business sectors.

Risk mitigation

The cloud can assist with bringing down chances related with customary innovation, for example, limit, overt repetitiveness and versatility concerns. Besides, the capacity of distributed computing to scale can outfit manages an account with more command over issues like security.

Money saving advantages

The expense reserve funds of public cloud arrangements are critical, particularly given the decrease in starting capital-consumption prerequisites for customary IT framework. During times of pinnacle client interest, besides, the cloud can permit banks to oversee registering limit all the more effectively. Also, when the cloud is taken on for risk-alleviation and advancement purposes, money saving advantages emerge from the resultant enhancements in business effectiveness.

Cloud innovation in financial assists monetary administrations associations to smooth out tasks with further developed productivity. Installment cycles can be additionally rearranged by interfacing the two purchasers and dealers on a common application. This further develops exchange speed and simpler to follow information.

FUTURE PREDICTIONS IN BANKING

Many banks disapprove of use of their product and equipment. Their PCs (the two servers and workstations) are not being utilized productively and this gives a squandered capital for them of some kind or another. To that end a few banks are now trying cloud arrangements as an approach to diminishing IT costs.

One of the Enormous Four review firms as of late

declared that banks will put almost multiple times the figure in distributed computing during 2014, contrasting with the prior year. A new Gartner report (from October 15, 2013) states that most ventures are confronting

speeding up tension for key change in 2014 and years past. It additionally shows that over 60% of banks overall will most likely cycle larger part of their exchanges in the cloud by 2016.

This will cause a lot of business process changes for the banks. As referenced by the Jonathan Davies, head of re-evaluating at Loyalty Public Data Administrations (FIS), the universe of banking is changing and there is a rising interest for re-appropriating and SaaS contributions on the grounds that mid-level banks find it hard to stay up with the latest with high market requests.

During these financial times it has ended up being clear that banks should re-examine a portion of their cycles to accomplish maintainability and proceed with the development and development they had quite a while back.

A portion of the means they should take are change of their item contributions and revamping their centre tasks to a more client driven one. One significant portion they should know about is the rising business sector of online instalment processors like PayPal and Google Wallet as well as versatile instalment frameworks like the Close field correspondence.
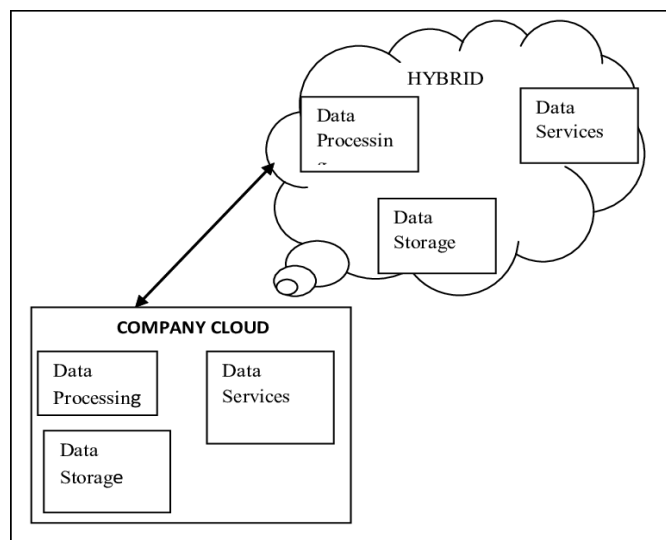
The main cloud executions of cloud in the financial fragment are as a rule for some non-centre business processes like HR or CRM. The experience Ongoing Advances in Financial matters,The board and banks

have gotten from those "test-frameworks" is the one that assists them with concluding how quick they will move to the cloud. This assists us with anticipating a few future patterns in cloud organization for the banks

CONCLUSION

Cloud has not yet been generally acknowledged as another IT foundation model in financial area however the circumstance is gradually evolving. Banks will put a lot of in the cloud before very long. Centre cycles will be the last to be worked from the cloud however CRM and HR examination will likely be the initial ones.

Clearly banks are analyzing cloud and perhaps are even previously working a portion of their business on it. Confidential cloud will be the most fascinating model, particularly in beginning phases of its arrangement. Mixture and local area mists could give some reinforcement capacity to the confidential cloud. It actually is not yet clear whether the public cloud will be coordinated in those frameworks and how much

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COMPUTER VISION IN AI

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Abstract - Computer vision is an area of exploration concerned with helping Computers in seeing. Computer vision issues point to construe something about the world from noticed picture information at the most unique level. It is a multidisciplinary subject that might be inexactly delegated a part of man-made reasoning also, AI, the two of which might incorporate utilizing explicit methods and utilizing universally useful learning strategies. As an interdisciplinary field of exploration, it might appear disordered, with strategies taken and reused from different designing and software engineering disciplines. While one explicit vision issue might be promptly tackled with a hand-created factual method, another may require a huge and modern group of nonexclusive AI calculations. COMPUTER vision as a discipline is at the cutting edge of science. Likewise with any wilderness, it is exciting and turbulent, with frequently no dependable power to go to. Various gainful ideas come up short on hypothetical establishment, and some speculations are delivered insufficient as a general rule; created locales are broadly scattered, and frequently one appears to be absolutely inaccessible from the other.

INTRODUCTION

As of late, COMPUTER vision has built up some decent forward momentum and fame as a result of the numerous applications it has tracked down in regions like wellbeing and clinical, sports and amusement, machine plan, and self-driving vehicles. A significant number of these applications depend on visual acknowledgment undertakings, for example, picture request, limitation, and ID. Late advances in Convolutional Brain Organizations (CNNs) have brought about an exceptional execution in these top tier visual acknowledgment tasks and systems, exhibiting the force of Convolutional Brain Organizations. Therefore, convolutional brain organizations (CNNs) have arisen as the essential structure blocks of profound learning calculations in

COMPUTER vision. Profound Brain Organizations (DNN) is a sort of brain network that has better picture ID abilities and is in many cases used in COMPUTER vision calculations. Convolutional Brain Organizations (CNN or Conv Net) is a subtype of Profound Brain Organizations (DNNs) that are frequently utilized in visual sign deciphering. Also, it is utilized in COMPUTER Vision and Regular Language Handling to sort out material (NLP). It is feasible to develop a convolutional brain network utilizing various underlying blocks. These primary blocks incorporate convolution layers, pooling layers, and completely associated layers, which will all be examined momentarily in this article. In the following segments, the creator covers Profound Learning and the numerous brain network methods lumped together. What's more, the book covers Convolutional Brain Organizations, their development, and their applications in a few fields, including medication and designing.

II. Writing Study

A. Profound Learning and Brain Organizations

AI is a subset of Profound Learning, a subset of Man-made reasoning (simulated intelligence). AI utilizes calculations and preparing information to naturally recognize designs and with minimal human mediation. Man-made consciousness is a technique for educating COMPUTERs to behave like people. Simultaneously, Profound Learning is enlivened by the design and capability of the human cerebrum, as addressed emblematically by a fake brain organization. While profound learning was initially proposed during the 1980s, it has shown critical advantages as of late for two essential reasons:

A. This requires a critical degree of information. For example, the advancement of independent vehicles requires the assortment of many pictures and extended video accounts. B. Profound learning requires an enormous limit with regards to

recording. High performance GPUs offer a
proficient equal plan that is well suited for

profound learning. At the point when utilized related to groups

or on the other hand distributed computing, this essentially brings the time expected down to train a profound gaining network from weeks to hours or less. [11].

Deep Learning vs. Computer Vision
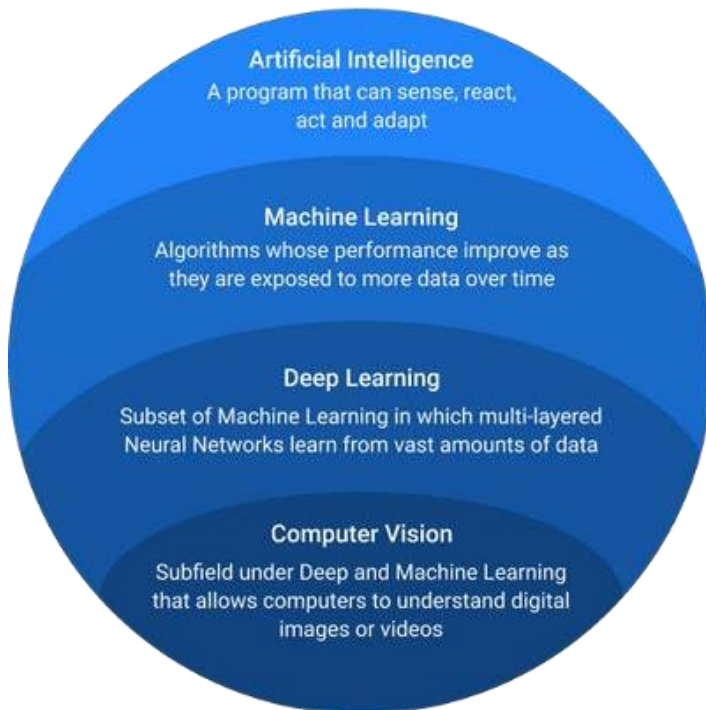
Various elements should be considered, each of which affects the Cost part. For example, the

area of the room, the quantity of rooms, and the postal division. Hence, in the event that we accept cost as a Result, the accompanying Brain Organization demonstrates the way that a brain organization could create that Result utilizing the boundaries expressed before as data sources.

Each circle addresses a neuron that is given an Initiation capability that processes the ideal Result by consolidating unmistakable qualities for different info boundaries. The Initiation not entirely set in stone by the calculation's motivation/application. For example, each circle addresses a neuron that is given an Initiation Capability that figures the ideal Result by consolidating particular qualities for different info boundaries. The Enactment not entirely set in stone by the calculation's motivation/application. For example, in the above

model, the goal is to decide the most extreme cost of a house. For effortlessness, let us guess that the Result is exclusively reliant upon two info factors, specifically the size and number of rooms. In this example, the greater the house and

the more rooms, the more prominent the cost of the house. Consequently, the Enactment Capability (Neuron) will be characterized in such a way that it will pick the best conceivable incentive for each information boundary and afterward figure the Result. Clearly, this is by all accounts exceptionally simple for this situation, however when countless variables are involved, independent direction isn't quite as clear as it seems in view of greatest or least qualities alone. Also, here is where Data Driven AI becomes an integral factor. The strategy exploits information saved (learned!) from past occasions to work out the ideal Result utilizing the Enactment Capability. The above model shows a Standard Brain Organization, which is frequently used to produce Result from measurable, mathematical, and other quantitative information. The sort of Brain Organization to still up in the air by the idea of the information that the calculation should deal with. The accompanying table sums up the abilities of various Brain Organizations in handling different sorts of information. [1] In the rest of this article, the writer will focus just on the Convolutional Brain Organization strategy utilized in Profound Learning.

B. Profound Picking up involving Convolutional Brain Organization for COMPUTER Vision In profound learning, a convolutional brain organization (CNN), frequently known as a ConvNet, is a sort of profound brain network that is every now and again used to investigate visual pictures. In specific regions, it is likewise alluded to as a convolutional brain organization (CNN). These fake brain networks are alluded to as move invariant counterfeit brain organizations or space-invariant counterfeit brain networks because of their common loads design and interpretation invariance properties (SIANNs). Calculations might be utilized to distinguish pictures and recordings, make recommender frameworks, sort pictures, do clinical picture investigation, and assess normal language. In the following part, the creator examines what Convolution is, the manner by which it separates information from pictures, and the engineering and parts of CNN, in addition

to other things. This will show how CNN analyzes the content of a picture and cycles the information to give the expected outcome to the crowd.

C. Design Outline

Convolution is a numerical strategy that takes two capabilities and produces a third capability that shows what the state of one capability is meant for by the state of the other. To finish the activity, the

Convolution interaction requires the estimation of the Outcome capability, as well as the introduction of the Outcome capability. Convolution is an information handling method that involves classifying the parts (content) of a picture to help AI and eventually produce the ideal Yield through the calculation. It is used in the handling of picture information. Profound Learning and Brain Organizations are two various kinds of brain networks that are fit for investigating picture information. Profound Learning is a sort of brain network that empowers information driven learning. As demonstrated by the methodology's name, the convolution interaction isolates the quality goods from the waste. This design might be viewedas a three-layered volume of neurons in a cell climate. A distinctive element of how CNNs have developed from before feed-forward variants is their capacity to further develop computational proficiency through the expansion of new layer types to their plan. Could we investigate the general plan of CNNs at the present time? [4] D. Fundamental CNN parts

1. Convolutional Layer:

 CNN, or convolutional brain organization, is a sort of brain network model that is intended for managing two-layered picture information, despite the fact that it might likewise be utilized to manage one dimensional and three-layered information. Convolution is achieved through the

utilization of a channel (a little grid whose size might be picked).

2. Pooling Layer:

 Spatial pooling (then again alluded to as subsampling or down testing) brings down the dimensionality of every component map while protecting the most basic information. Spatial pooling might happen in various ways: Quantifiers incorporate the terms most extreme, normal, and aggregate. Assuming that Maximum Pooling

happens, we characterize a spatial area (for instance, a 22-window area) and pick the greatest part from the changed feature map contained inside that area. Instead of picking the greatest part, we could pick the normal (Normal Pooling) or a sum of all parts included inside that window. Max Pooling has been demonstrated to be progressively powerful with time. [8] Max pooling, as displayed underneath, picks the part with the biggest size from the redressed include map. Picking the greatest part is equivalent to utilizing the traditional pooling strategy. The expression "aggregate pooling" alludes to the get-together of all parts in a component map. [8]

3. Completely Associated Layers:

 Completely Connected layers have each neuron in the layer above it associated with each neuron in the layer underneath it. To just put it, FC works in a similar way as a customary brain organization, for example, a Multi-facet Perceptron, does (MLP). The fundamental differentiation is that data sources would be formed and coordinated in the way characterized by before periods of a CNN, as opposed to the reverse way around. [7]. As represented in the chart underneath, the element map framework is changed over into a vector as$(x1,x2,...xn)$ by using the FC layer, and the subsequent vectors are converged to make a model. Then, at that point, utilizing the actuation capability, we can group the Result into various classifications.

APPLICATIONS

A. Medical services:

COMPUTER vision is widely utilized in the determination of illnesses by investigating X-beams, attractive reverberation imaging (MRI), and other clinical pictures. It has been demonstrated to be similarly all around as persuading as customary human experts in the space with regards toprecision. Consistently, COMPUTER Vision is actually diagnosing pneumonia, frontal cortex growth's, diabetes,

Parkinson's disease, threatening uterine development , and a large group of other clinical issues, and the innovation is getting further developed. With the utilization of top tier picture handling innovation and COMPUTER vision

strategies, early distinguishing proof of any potential sicknesses will be achievable. As such, treatment might be managed at a badly designed time during the sickness or, regardless, the probability of their common is diminished [2].

B. Car:

With the extended exposure of oneself driving automobiles, vehicle organizations are vivaciously dependent upon COMPUTER Vision since it is expected for figuring out the driving condition, including distinguishing obstructions, individuals on pathways, and possible crash ways. Self-driving automobiles are bit by bit progressing into the market, with additional associations looking for innovative ways to deal with bring logically electric vehicles onto the road. COMPUTER Vision advancement empowers these self-driving vehicles 'to see' the earth while man-made intelligence estimations make the "personalities" that assist that COMPUTER Vision with deciphering the things around the vehicle. Self-driving cars are outfitted with various cameras to give a complete 360-degree viewpoint on nature inside the extent of a few meters. Tesla vehicles, for instance, use something like 8 includes cameras to achieve this achievement. Twelve ultrasonic sensors for distinguishing hard and sensitive articles all over town and a front-situated radar that enables the recognizable proof of various vehicles even through storm or fog are furthermore acquainted with supplement the cameras. With a ton

of data being energized into the vehicle, a fundamental COMPUTER will not be adequate to manage the immersion of information. This is the explanation all self-driving cars have a locally accessible COMPUTER with COMPUTER Vision features made through man-made intelligence. The cameras and sensors are shared with both perceive and bunch fights in nature - like individuals by walking. The region, thickness, shape, and significance of the things should be thought about rapidly to enable the rest of the driving system to make appropriate decisions. All of these computations is only possible through the joining of AI and profound brain frameworks, which brings about features like the individual by walking acknowledgment [15].

Our full comprehension of the universe depends on photon assessments, which are generally made out of photos of the universe. This makes the way for the capability of using COMPUTER Vision in space science since our universe is so gigantic, and our universe's solitary normal decide predicts that the information accumulated will be comparably enormous. It will be unimaginable for the stargazer, or for any other person, to examine this data completely truly. We can translate each of the information in a brief timeframe, because of COMPUTER Vision. To put it another way, COMPUTER vision is at present being used to track down new planets and enormous bodies, with applications, for example, exo planet imaging, star and vast framework gathering, and other comparative undertakings [3].

D. Industrial:

In Businesses, COMPUTER Vision is used on the mechanical creation frameworks for really looking at gatherings, distinguishing hurt parts, for the assessment of the finished product. Here, Machine Vision devices help in finding microscopic level acquiescence in things that essentially can't be recognized through human vision. In collecting endeavors, examining scanner labels or QR code are key as they give an exceptional unmistakable evidence to a thing. Scrutinizing a considerable number normalized recognizable pieces of proof in a day is definitely not a basic task for individuals;

108

simultaneously, it might be done successfully in minutes through COMPUTER Vision [3].

V ConvNet Engineering

C. Space science:

Convolutional Brain Organizations (CNNs) is a sort of brain network that has been around since the mid-90s. You'll find a few additional outwardly capturing plans in the part beneath [9]. A convolutional brain network was currently being made from the last part of the 1990s to the center of the 2010s, and it was known as LeNet during that time span. The assignments that convolutional brain networks could do developed progressively intriguing as a consistently expanding amount of data and handling power became open.

(2).AlexNet (2012) - In 2012, Alex Krizhevsky (along with others) distributed AlexNet, which was a more inside and out and considerably more complete variant of the LeNet. AlexNet was the unmistakable champ of the debut ImageNet Enormous Scope Visual Acknowledgment Challenge (ILSVRC) in 2012, beating the opposition overwhelmingly. This examination addressed a significant progression over earlier strategies, and the broad utilization of CNNs today might be connected back to the discoveries of this review. A Convolutional Organization made by Matthew Zeiler and Loot Fergus was introduced at the ILSVRC 2013 as a component of the 3.ZF Net (2013) meeting. The ZDNet was the moniker that was given to this organization (short for Zeiler and Fergus Net). It was possible to make enhancements to AlexNet by changing the plan hyperparameters utilized in its creation. At the point when Szegedy and partners from Google introduced a Convolutional Organization at the ILSVRC 2014 gathering, it was given the moniker "GoogleLeNet" (2014). This association's primary objective was the production of a Commencement Module that altogether diminished the quantity of boundaries in the framework (4M, appeared differently in relation to AlexNet with 60M). In the 2014 Worldwide Laser Checking and Vision Exploration Meeting (ILSVRC), a framework that became known as the VGGNet was quick to cross the end goal. Specifically, it pointed toward showing how significant it is for productive execution to have a framework with adequate profundity (i.e., layers). It was Res Nets (2015), a

Lingering Organization made by aiming He (and others), that was granted 6th spot in the ILSVRC 2015. Res Nets (2015) was the champ of the ILSVRC 2015. Convolutional Brain Organization models, for example, Re sNets are right now overwhelmingly thebestin-class models, and they will keep on being the default choice for using Conv Nets for years to come (as of May 2016). The seventh source is Dense Net, which was sent off in August 2016. An organization of hubs that are firmly pressed together. This thickly connected convolutional network, created by Gao Huang (and others) and distributed as of late, has each layer straightforwardly associated with each and every layer in a feed-forward engineering, with each layer being clearly related with one another layer. Following the finishing of five profoundly focused article affirmation benchmark tasks, the DenseNet was found to have acquired significant additions over earlier top tier structures, results uncovered. View this video to see precisely the way that the Light was done.

Conclusion

Network and made sense of exhaustively a convolution activity, the framework design of CNN, and how the layers of CNN work in coordination to recognize the features and the examples of an picture. Utilizing these calculations creator has depicted how CNN can be applied in different businesses. Through this paper, it tends to be reasoned that CNN has turned into an extremely useful asset in AI. By giving different pictures as information at the AI stage can work with the growing experience quicker, and the information can be sent for various result capabilities, which is a significant benefit of CNN. Aside from the application, the creator referenced in the prior area that CNN is currently likewise being considered for IOT, Business, and homegrown security frameworks. In this way, CNN has acquired an extremely conspicuous spot in Information Designing regardless is acquiring.

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Construction Of An Active forecasting Model for Covid Disease Predictions Using Machine Learning Approaches

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Abstract: COVID-19 outbreaks only affect the lives of people, they test in a gloomy impact on the economy of the country. Approaching Apr. 30, 2021, it was declared as a health emergency for the entire globe bythe State Health Organization (SHO). By Sep. 28, 2020, more than 1 million people were infected by this virus and there was no vaccine to prevent. The SHO releasedcertain guidelines for safety, but they were only precautionary measures. The use of Research with a focus on fields such as data Science and machine learning can help in the fight against this Covid-19 disease. It is important to have early warning methods through which one can forecast how much the disease will affect public, on the basis of which the government   can   take   necessary   actions   without   affecting   its   economy.

Introduction: The data mining tutorial provides basic and advanced concepts of data mining. Our data mining tutorial is designed for learners and experts.Data mining is one of the most useful techniques that help entrepreneurs, researchers, and individuals to extract valuable information from huge sets of data. Data mining is also called ***Knowledge Discovery in Database (KDD)***. The knowledge discovery process includes Data cleaning, Data integration, Data selection, Data transformation, Data mining, Pattern evaluation, and Knowledge presentation.this paper, we include methods for ANN future cases based on existing data. Machine learning approaches are used and two solutions, one for predicting the chance of being infected and other for forecasting the number of positive cases, are discussed. Linear Regression , random forest and Bayes Theorem classifiers, were selected; both have an accuracy of more than 70%. Other classifier has 93.62% accuracy. These results can be used to take corrective measures by different governmental bodies. The availability of techniques for forecasting infectious disease can make it easier to battle COVID-19.

Keywords: COVID-19 Data Set, Random classifier, Forecast, Prediction, Random forest, Linear Regression.

Our Data mining tutorial includes all topics of Data mining such as applications, Data mining vs Machine learning, Data mining tools, Social Media Data mining, Data mining techniques, Clustering in datamining, Challenges in Data mining, etc.

Zuo researched and analysed the characteristics of network viruses and designed a computer data mining module. He combined the data mining technology with the dynamic behaviour interception technology to mine hidden information .the innovative point of this research on the

realization of economic intelligence systems based on the data mining technology lies in the use of a combination of association rulesand clustering two data mining methods to realize data information mining. It can not only mine the potential information of the data well, but also improve the efficiency of data mining. ,is research uses the least mean square algorithm to optimize the research, which improves the experimental effect to a certain extent.

Data Mining Technology and Intelligence Systems:

Data Warehouse the Concept of Data Warehouse. A data warehouse is a subject- oriented, integrated, irreplaceable, and time changing collection used to support the analysis, decision making, and development of an enterprise or organization. ,e data warehouse is a powerful combination of different resources.

DataSet: Explore, analyze, and share quality data. Learn more about data types, creating, and collaborating.

Decision Tree: Decision Tree is a supervised learning method used in data mining for classification and regression methods. It is a tree that helps us in decision-making purposes. The decision treecreates classification or regression models asa tree structure. It separates a data set into smaller subsets, and at the same time, the decision tree is steadily developed. The final tree is a tree with the decision nodes and leafnodes. A decision node has at least two branches. The leaf nodes show a classification or decision. We can'taccomplish more split on leaf nodes-The uppermost decision node in a tree that relates to the best predictor called the root node. Decision trees can deal data.
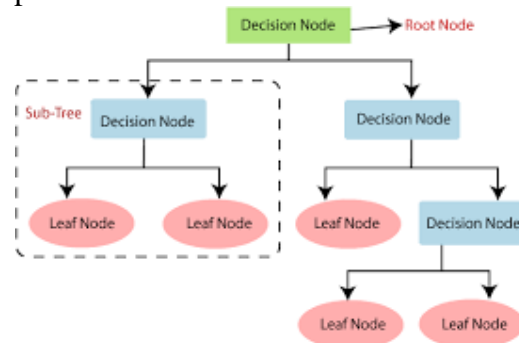
Random Forest:A random forest is a meta estimator that fits a number of decision tree classifiers on various sub-samples of the

dataset and uses averaging to improve the predictive accuracy and control over-fitting. The sub-sample size is controlled with the max_samples parameter if bootstrap=True (default), otherwise the whole dataset is used to build each tree.

Prediction: process of data analysis is prediction. It is used to find a numerical output. Same as in classification, the training dataset contains the inputs and corresponding numerical output values. The algorithm derives the model or a predictor according to the training dataset. The model should find a numerical output when the new data is given. Unlike in classification, this method does not have a class label. The model predicts a continuous-valued function or ordered value.

Regression is generally used for prediction. Predicting the value of a house depending on the facts such as the number of rooms, the total area, etc., is an example for prediction.

Linear Regression: Regression refers to a data mining technique that is used to predict the numeric values in a given data set. For example, regression might be used to predict the product or service cost or other variables. Linear regression is the type of regression that forms a relationship between the target variable and one or more independent variables utilizing a straight line. The given equation represents the equation of linear regression

$Y = a + b*X + e.$ Where,
a represents the intercept
b represents the slope of the regression line e represents the error

Regression and Classification: Regression and classification are quite similar to each other. Classification and Regression are two significant prediction issues that are used in data mining. If you have given a training set of inputs and outputs and learn a function that relates the two, that hopefully enables you to predict outputs given inputs on new data. The only difference is that in classification, the outputs are discrete, whereas, in regression, the outputs are not. But the concepts are blurred, as in "logistic regression", which can be interpreted as either a classification or a regression method. So, it becomes difficult for the user to understand when to use classification and regression.
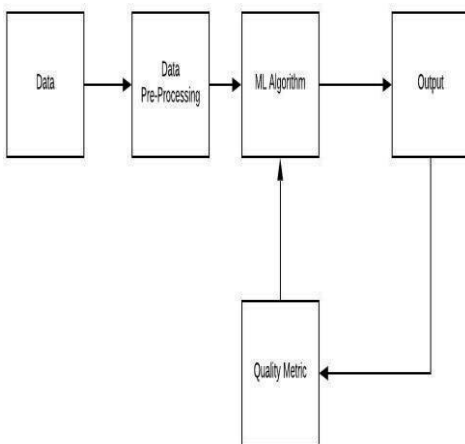
Fig:1:Block Diagram of Data Ware house.

Technical Concepts of Data Mining:

(1) Identify and gradually understand the application areas.

(2) Select the dataset to be studied.

(3) Data integration.

(4) Data cleaning, de duplication, and error removal.

(5) Develop models and construct hypotheses.

(6) Data mining.

(7) Interpret and express the results and display them in a humane way.

(8) Inspection results.

(9) Manage the discovered knowledge.

Mutation : Genetic Algorithms(GAs) are adaptive heuristic search algorithms that belong to the larger part of evolutionary algorithms. In each generation chromosomes(our solution candidates) undergo mutation and crossover and then selection to produce a better population whose candidates are nearer to our desired solution. Mutation Operator is a unary operator and it needs only one parent to work on. It does so by selecting a few

genes from our selected chromosome and apply the desired algorithm.

In this article, I will be talking five Mutation Algorithms for string manipulation –
1) Bit Flip Mutation
2) Random Resetting Mutation
3) Swap Mutation
4) Scramble Mutation
5) Inversion Mutation

Results:

Accurancy: The accuracy of a classifier is given as the percentage of total correct predictions divided by the total number of instances.
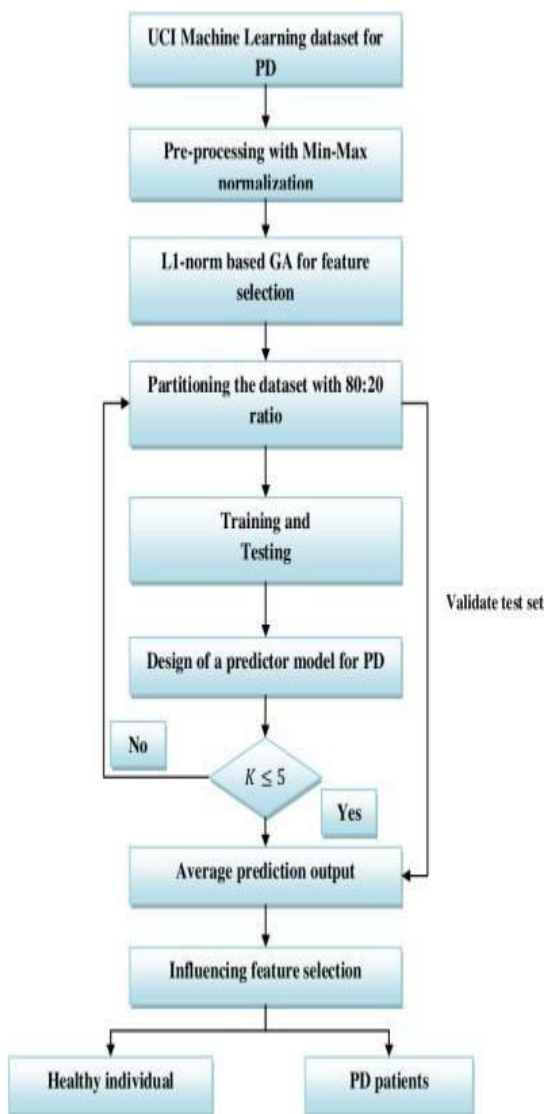
Fig:2 Flow Chart of L1 Norm Based Model
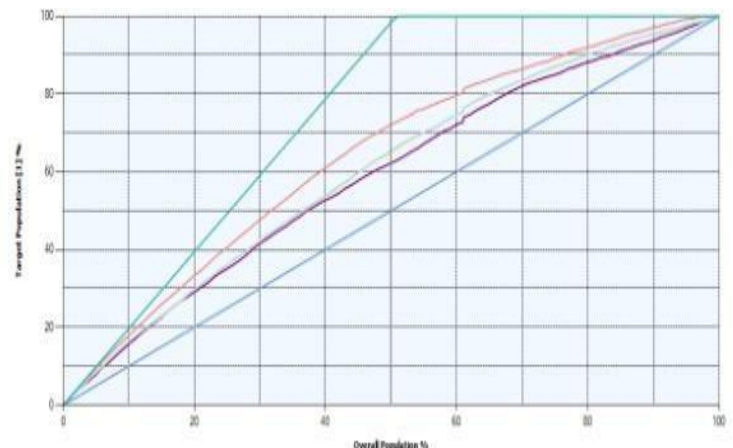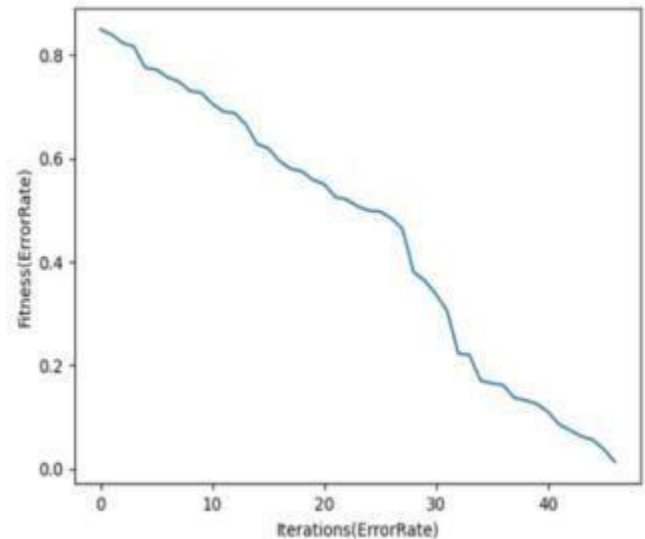
Conclusion: Therefore, an optimal PD evaluation is extremely considered as a valuable factor for efficient management of people health with PD. Therefore, this work concentrates on designing a disease monitoring system by stochastically establishing the relationship among the wrist movements during the regular activities and clinical observations during the exploitation of movement abnormalities. The motor signs are analyzed and estimated autonomously with the modeling of stacked auto-encoder for Support Vector Machine (SAE-SVM) for measuring three classes that are observed during movement abnormalities such as dyskinesia, bradykinesia, and tremor. This work adopts some clinically approved severity measures for monitoring the symptoms for training the SAE-SVM model.

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DEVELOP A MODEL FOR BRAIN PATHOLOGY CLASSIFICATION USING MACHINE LEARNING TECHNIQUES

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Abstract—**It is crucial to get an early diagnosis of brain tumors in order to increase patient survival and treatment results. It is difficult to manually evaluate the magnetic resonance imaging (MRI) images. Using traditional image processing techniques, the work of diagnosis as well as its automation has proven to be incredibly challenging. Evaluation of shape, volume, boundaries, tumor detection, size, segmentation, and classification, however, continues to be difficult. This study describes a deep learning technique for detecting disease in brain images. In the suggested approach, we use resnet50 to implement the hybridized algorithm, which will increase the system's precision. In order to predict brain pathology at an early stage, features are retrieved from brain pictures using machine learning algorithms and deep learning models.In general, the suggested method seeks to improve the efficiency of classifiers that do not use deep learning. The primary objective of this study is to provide a superb MRI brain tumor classification rate utilizing ResNet50. A higher accuracy rate of 99.7% is attained with the suggested algorithm. The suggested method performs better than the current algorithm.**

Index Terms— ResNet50, Magnetic Resonance Imaging (MRI), Deep Learning, Hybridized Learning, Feature extraction, Testing of images.

I. INTRODUCTION

A brain tumour is an abnormal cell development that can be cancerous or non-cancerous and can be benign or malignant. The majority of researchers are working on the most common kind of tumour, such as gliomas. Chemotherapy, radiation, and surgery are a few of the treatments available for gliomas. The required clinical information, such as tumour presence, location, and type, can be collected automatically using computer-assisted devices. Assessing their volume, form, borders, size, segmentation, and classification remains a very

difficult task. The severity of a brain tumour also differs from person to person.Because of its greater picture contrast in soft tissues and non-invasive nature, magnetic resonance imaging (MRI) is recommended over alternative therapy and diagnosis techniques.

Due to significant variability and inherent MRI data properties, such as variability in tumour sizes or shapes, tumour identification, area computation, segmentation, classification, and discovering ambiguity in segmented region, brain tumours are a tough task to perform. Picture segmentation is the most important problem in image interpretation since it aids in feature extraction, area calculation, and importance in many practical applications. For instance, it can be utilised for image registration, atlas matching, tumour localisation, tissue classification, blood cell delineation, and tumour volume estimation. The precise and morphological quantification of tumours is a crucial responsibility for monitoring oncologic therapy. However, despite substantial scale work being done in this area, physicians still rely on manual tumour determination because there is no connection between researchers and clinicians. According to the feature selection and learning mechanism, there have been numerous recent strategies developed for automatically classifying brain tumours. These techniques can be divided into machine learning (ML) and deep learning (DL) techniques.

The selection and extraction of features is crucial for classification in ML techniques. However, DL methods directly extract and learn the image's features. Recent DL methods, especially CNN, are widely employed in medical image analysis because they offer good accuracy. Additionally, they are less accurate for applications where we have access to tiny datasets, require expensive GPUs, and have disadvantages over classical approaches (ML) in that they require big datasets for training, have significant time complexity, and ultimately increase user costs. Furthermore, choosing the appropriate deep learning tools can be difficult since it requires understanding of

many parameters, training strategies, and topology. However, in the field of medical imaging, machine-learning techniques have been crucial. Support vector machine (SVM), artificial neural network (ANN), sequential minimal optimization (SMO), fuzzy C mean (FCM), Naive Bayes (NB), Random Forest (RF), Decision Tree (DT), and K-Nearest Neighbor are just a few learning-based classifiers that have already been used for classifying and detecting brain tumours (KNN).

This study covered the mapping of the brain to find aberrant tissues. To remove any artefacts from the photos for post-processing, noise removal was the method utilised for the mapping. A hybrid k-based clustering technique was used for the segmentation process [4]. The optimization algorithm was used to select the value. for the clustering process, of clusters. The purpose of the neural-based labelling procedure was to mention the brain's tissues in various colours. based on the peak signal-to-noise ratio, the mean absolute error value, and the accuracy of the picture classification In terms of ratio, the outcomes are contrasted with current neural network models and picture classification techniques.

II. RELATED WORK

The aberrant brain image was proposed by Hemanth et al. [1] using the deep convolution technique. this was the mental image categorised using the dataset. The deep convolution neural network was used to lessen the complexity of the design. The convolution neural network model employed DCNN, a deep learning method. The image was classified using the dataset for atypical brain tumours. Three layers of DCNN were used in this instance to carry out the classification. The convolution layer served as the top layer and offers trained parameters for the higher-level features. The ReLU Layer, which corrects the linear unit layer, was the following layer. The Max-Pool layer came in last. After obtaining the four-cluster region, it was used. Metastasis, meningioma, glioma, and astrocytoma were all categorized.

The nervous systems are impacted by deep-seated illnesses like MS. as a result of earlier prediction. The concurrent tumours and MS was postulated by Halimeh and Tesh- nehlab [2]. With the use of the convolution neural network, classification and diagnosis Here, the image was classified and diagnosed using an image processing technique. CNN was consulted here. The internal image pixel multiplications of the MRI picture were classified using the image. after diagnosis, this finds the lesion, tumour, and infected area.

For the purpose of classifying MRI images for a dataset of brain tumours, Narmatha et al. presented a fuzzy brainstorm optimisation alternative method. This method combines fuzzy optimization with brain-storming approaches. Brainstorm optimization

prioritises on-cluster centres, whereas fuzzy builds on several iterations to create the best network layout. Their suggested approach achieved 93.85% accuracy, 95.77% sensitivity, 94.77% precision, and 95.42% F1 score using the brain tumour segmentation (BraTS) 2018 dataset [17]. A novel approach for active deep learning-based feature selection for brain tumour segmentation and classification has been put forth by Sharif et al. For the construction of the saliency map, contrast enhancement was used, and this applied the threshold to convert to binary.

Additionally, deep features were extracted using the InceptionV3 pretrained model and merged with the dominating rotated LBP features for a more accurate texture analysis. The vectors were then optimised using particle swarm optimization (PSO), and the SoftMax function was used to classify them. The authors used the BraTS 2017 and BraTS 2018 datasets. The algorithm attained dice scores of 83.73%, 93.7%, and 79.94% for a core tumour, a full tumour, and an augmented tumour, respectively, using the BraTS 2017 dataset. With the BraTS 2018 dataset, the algorithm produced dice scores for a core tumour, a full tumour, and an augmented tumour of 88.34%, 91.2%, and 81.84%, respectively [18], while Dandu et al.

A DL model for BTs detection that combines hand-crafted and deep features was proposed by Ramzan et al. [35]. By using a grab cut method and other morphological manipulations, the authors segmented BTs. Additionally, using a serial-based strategy, the deep learning (VVG19) and manually derived components for the tumour segments were combined. Several classifiers received these concatenated features. Using the nonsubsampled contourlet transform (NSCT) and NSCT fused separately, Raja et al. [36] improved the MR pictures. Sub-bands at low and high frequencies were independently coupled.

Shen et al. [25] used concurrent FCNs and conditional random fields to describe a brain tumour segmentation. In this article, a perfect setup with pre-processing, segmentation, and post-processing was described for the segmentation of MRI brain tumours. Three filters, such as the Median, Gaussian, and Gabor filters, were chosen at the outset of pre-processing to deal with the initial MR images. Similar to this, three concurrent Fully Convolutional Networks were utilised to train three different filtered multi-MRI pictures in accordance with one another and combine three results using linear regression. Every pixel in the image can be predicted by a network that uses only convolutions, as well as both global and local information.

III. PROPOSED METHODOLOGY

The suggested study intends to enhance the functionality of conventional classifiers. These classifiers are suitable for computer assisted brain

tumour identification and classification since they only require minimal datasets for training and have a low computational time complexity. In this study, a hyperspectral imaging (HSI)-based model for the categorization and detection of brain tumours is put forth. In order to improve the performance of the suggested model and obtain accurate findings in terms of detecting brain tumours, the brain tumour mapping technique was applied in this study.

In order to identify the brain tumour, the suggested model involves preprocessing, filtering, optimization, clustering, labelling, and classification operations.

The technique of mapping involves using different colours to indicate the various sections of the same qualities. To better effectively grasp the areas, a mapping procedure is employed. This work explores a similar mapping procedure for detecting the aberrant brain tissue. The tumour cell whose growth was accelerating without any discernible pattern was referred to as abnormal tissue [22, 23].
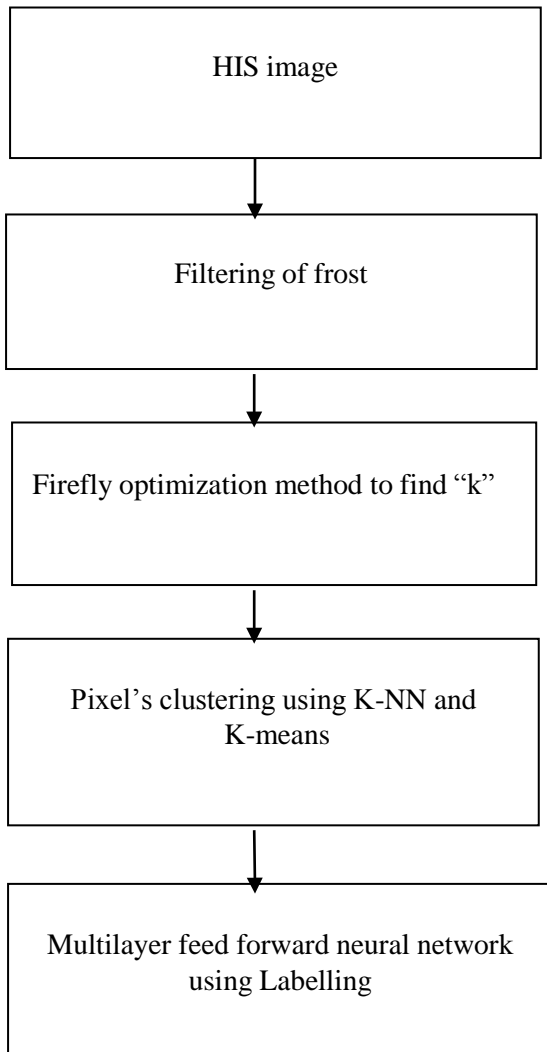
Fig. 1. Flow chart for mapping process

A. Dataset collection and data augmentation

The dataset was obtained from the Kaggle website. Image augmentation involves rotating, moving, and flipping images. Using image preparation techniques, noise and blurring of pictures Data augmentations result from straightforward operations such random cropping, colour space augmentations, and horizontal flipping. Many of the earlier highlighted in variations that pose difficulties for picture recognition tasks are encoded by these modifications. There are numerous types of image filters, including mean, median, and wiener filters, as well as numerous types of picture noise, including space noise, Gaussian noise, salt and pepper noise, and speckle noise.

B. Preprocessing

Preprocessing is the second process, in that We conducted image resizing to every image throughout the preprocessing phases. Resize the image to [0 255] pixels. The image's pixel range All of the photographs are resized according to the pixel ranges of their rows and columns.

C. Feature Extraction

The discrete wavelet transform is used to extract an image's features. used DWT feature extraction as the input method for the photos. Since 2D imaging is the main focus, DWT must be applied disjointedly to each dimension. Low-Low (LL), Low-High (LH), High-High (HH), and High-Low (HL) pictures at each level are separated into four sub-bands, with 1, 2, and 3 denoting the corresponding levels.

D. Training of Images

Feature extraction is done using the resnet50 model, which extracts features five times faster than a convolution neural network. For the purpose of extracting picture features, Keras with the TensorFlow module is developed. Each of the five stages in the ResNet-50 model has a convolution and an identity block. Three convolution layers are present in each convolution block, and three convolution layers are likewise present in each identity block. Over 23 million parameters can be trained with the ResNet-50. After 100 epochs of training with the Adam optimizer and a learning rate of 0.0001, the Keras ResNet achieved an accuracy of 75%. You can use Keras to load your pre-trained ResNet 50 system, which will then be loaded and trained.

E. ResNet50

ResNet-50, also known as the Residual Network, is presented for the extraction of image features during image training. ResNet-50 has also been trained on the ImageNet database of 1000 categories, performing better than average with an error rate of 3.57%. The ResNet-50 architecture consists of convolutional

layers, pooling layers, and numerous residual layers, each of which is made up of batch normalisation layers and residual blocks of convolutional layers. ResNet-50's configuration is unique in that it has four residual layers, a dense layer, and an output layer with a soft maximum activation function.

As shown in Fig.2, each convolution layer's design and implementation are added with a shortcut connection in a residual block before the output is propagated to the following block. Compared to other pre-trained models, ResNet-50 has the benefit of giving a remarkable speed-up convergence. ResNet-50 design with residual units, filter size, and outputs for each convolutional layer displayed. This network's DRF, which was extracted from the last convolutional layer, is also displayed. Key: The convolutional layer block's notation k k, n designates a filter with k channels and a size of k. The completely connected layer with 1000 neurons is designated as FC 1000. The repetition of each unit is indicated by the number at the top of the convolutional layer block.
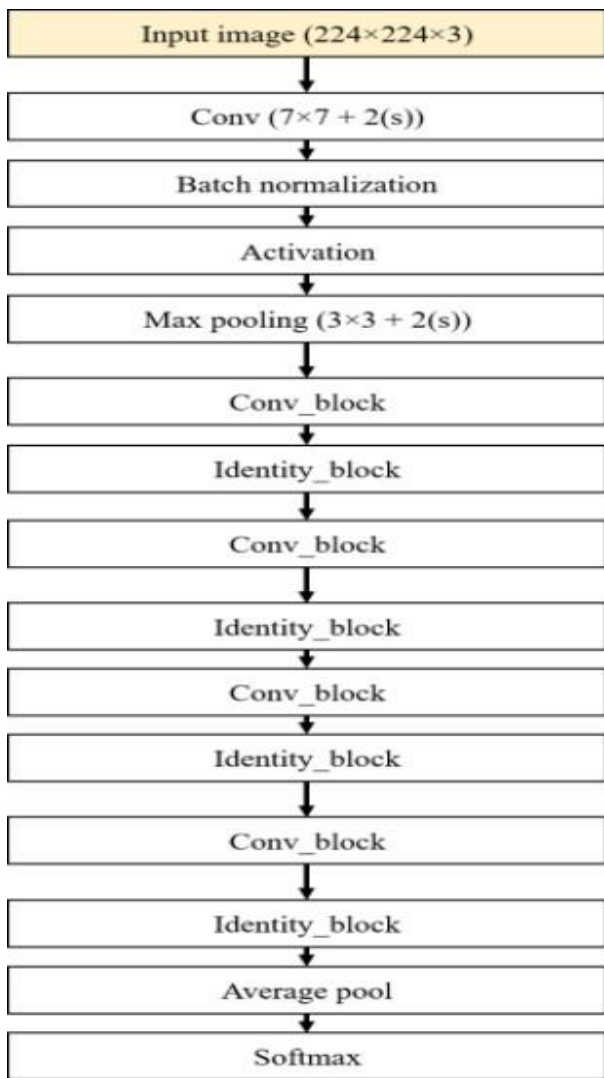
Fig. 2. ResNet50 model

IV. TESTING AND ACCURACY ANALYSIS

The various testing inputs used for brain pathology testing are used to verify the results. Various brain pathology images and stork images are being analyzed to determine their accuracy, sensitivity, and specificity. Better accuracy and less image validation loss are provided by this system's hybrid model.

Output Screenshots:
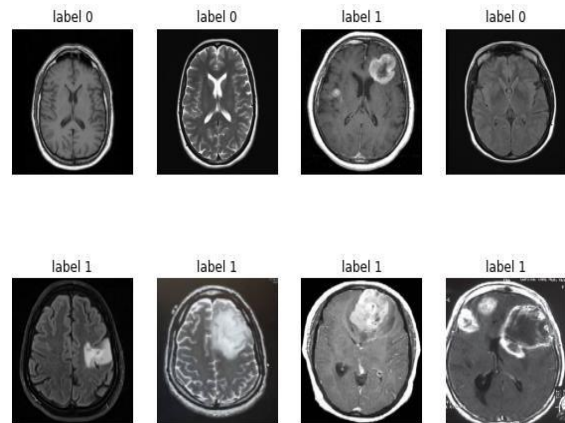
Fig. 3. Output Screenshots

V. CONCLUSION

This study suggested an unsupervised method for clinical care based on the patient's estimated brain tumour size. K-means clustering, firefly optimization, and MFNN are used to map and localise the brain. The brain-molecule optimization method is addressed by the proposed multilayer feed forward neural network (MFNN), which minimises trial and error. As a result, the suggested improved mapping procedure gave better results in every format and is appropriate for mapping the molecules in the spectrum medical image. Comparisons are made between the proposed model and k-NN, DNN, PSO, LSVM, and DCNN. With a sensitivity of 96.32%, which is 2.06% to 5.1% better than other methods, and specificity of 98.24%, the proposed model achieved 96.47% accuracy, which is 1.17% to 3.13% higher than previous procedures. By using the deep learning model of ResNet50 which increase the accuracy than existing system.

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DIABETES DIAGNOSING USING SUPERVISED LEARNING ALGORITHM

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ABSTRACT

Diabetics disease prediction modeled using partially observable Markova decision process (POMDP) is proposed. In emergency, the patient is alerted through the doctor by fog computing. Ambulance sent to the location of patient at critical situations. The doctor gets the data through fog computing iFogSim. Fog computing in healthcare is a new area, which gains more attraction in research community. Many researches focus on cardiovascular disease i.e. Diabetics disease. The important risk factor for cardiovascular disease is increase in blood viscosity. The highly viscous nature of blood does not allow the blood to flow creating a resistance in the blood flow. Diabetics disease risk factors are high blood pressure, obesity, diabetes, increased blood viscosity, etc. With the help of POMDP's states, observations, beliefs, probability transitions the patient health is noted. The POMDP model for Diabetics disease prediction computes the policy approximation using states and timeslots. Rewards are tabulated using policy approximations over different iterations.

1. INTRODUCTION

The up-coming developments and research in the technology has adjusted the epicenter of the medical sciences not only for analysis but rather how to prevent those diseases with incomplete recognition and appropriate along with precise health information through a leading in demand technology called the "Internet of Things" .In order to record physiological symptoms and signals, various efficient devices have been discovered and are feasible in the market which can be easily connected to the internet over smart phones, computer or any nodal devices. There is a high potential appeal of the fog computing inside the IoT-based monitoring systems as per the contemporary surveys. The Internet of Things is pointed out towards the physical objects like appliances, electronics, devices which are always developing throughout the world that can feature internet connectivity within an IP address using unique identities are interconnected for enabling the various objects to interact and act accordingly. For obtaining various essential signs within real time, efficient and working in active way occurring in medical devices which includes ECG or for maybe for measuring pressure and temperature, WBAN is used as among various basic prototypes in IoT methodology of healthcare. WBAN establishes a multitude imperceptible or attire sensor node to percept and convey the data over a wireless network. The transmission protocols used for this are Wi-Fi or IEEE.802.15.4. Basically WBAN-based structure is Low-cost and power competent and plays a leading role in several region of healthcare environments such as tracking, and care clinic towards various disease management including chronic and

taken precaution towards it. Distant cloud servers are used in many health monitoring systems for keeping and organizing huge data possessed as of sensor nodes in huge quantity. Cloud computing has a number of benefits like services which are made cheap, capacity for the huge facts storing capability and more surplus preservation rate but few challenges also exists like large data transmission, location perception and latency-sensitive issues. For the slowdown in data transmission and data error packet dropping possibilities have increased. More the data is sent over a grid system, the greater is the chance of mistakes that may result in wrong or less precise treatment decisions for which there will be adverse effect on emergency situation and critical illness of mankind.

Thus, there will be a great requirement of minimizing the flow of data absorbed system in excess with the value of provision. One solution for accomplishing the problem of a predictable gateway and a remote cloud server is by adding a coat in between them. This added coating is termed as fog sheet and it aids in lowering the large chunks data but also yet guarantying service quality and so protecting the bandwidth of the network by pre-analysing the information. Also, fog computing provides services of higher level at the edge of the wireless systems well as

reduces the burden of the cloud . Although the cloud computing hypothesis is brought by cloud computing a the edge of the network, it also reports which aren't proved before unfit in the cloud computing paradigm. Some of the fundamental characteristics of fog computing are low latency, geographical distribution, edge localization, location awareness, inter operability, as well assist aimed at on-line analytic. That is why Fog computing can be taken into consideration for advancing the human health observing WBAN-based systems for the feature like low energy, little bandwidth, truncated processing power and involving the hardware with constrained nodes.

To say in literal words, the arrangement of WBAN-based system, with cloud computing and also fog computing can be a defensible clarification aimed at summoning in the recent IoT healthcare systems. As a concept, effective IoT-enabled healthcare system constructions presented and can be profited starting the idea of fog and edge computing. Utilizing the arrangement, we all came-up with an effective fog computing and edge computing healthcare systems which will be IoT enabled and can be utilized in bandwidth also with QoS guarantee, and backup reminder.

This paper primarily focuses on the following

three important aspects:

- The requirements of IoT based Healthcare model and the description of services provided by Fog computing layer to address them.

- The architecture of an IoT based healthcare system embedding Fog computing layer.

- Implementation of the fog computing layer services along with performance andadvantages.

In Huge detecting information is created in the several frameworks at various applications, for example, inquire about huge organizations. Cloud is where the information can be stored, serviced and figured on the cloud. Since the information is enormous volume, there's need of information preparing, for instance, information compression. Due to the information pressure, system requires huge versatility and proficiency for handling the expansive quantity of information in the high rate. In it are featuring the method for the pressure of the data. This strategy depends on the cloud necessity for information stress and similitude count between information chunks. In this technique proper the large information is separated into the exclusive lumps and in a while those portions are packed through the pieces. Here the calculation known as

Jacquard is utilized to find out the closeness between the data. Then this calculation is contrasted and the modern-day.

2. LITERATURE SURVEY

2.1 SUPPORTS-VECTOR NETWORKS (1995)

The support-vector network is a new learning machine for two-group classification problems. The machine conceptually implements the following idea: input vectors are non-linearly mapped to a very high dimension feature space. In this feature space a linear decision surface is constructed. Special properties of the decision surface ensures high generalization ability of the learning machine. The idea behind thesupport-vector network was previously implemented for the restricted case where the training data can be separated without errors. It here extend this result to non-separable training data. High generalization ability of support-vector networks utilizing polynomial input transformations is demonstrated. It also compare the performance of the support-vector network to various classical learning algorithms that all took part in a benchmark study of Optical Character Recognition.

2.2 IMPROVEMENTS TO PLATT'S SMO ALGORITHM FOR SVM CLASSIFIER DESIGN (2001)

This article points out an important source of inefficiency in Platt's sequential minimal optimization (SMO) algorithm that is caused by the use of a single threshold value. Using clues from the KKT conditions for the dual problem, two threshold parameters are employed to derive modifications of SMO. These modified algorithms perform significantly faster than the original SMO on all benchmark data sets tried.

2.3 SUPPORT VECTOR MACHINE CLASSIFIERS USING RBF KERNELS WITH CLUSTERING-BASED CENTERS AND WIDTHS (2007)

Focuses on support vector machines (SVMs) with radial basis function (RBF) kernels to solve the large-scale classification problems. It decompose a large-scale learning problem into multiple two-class problems with the one-verse-all decomposition technique, and then propose an adaptively clustering method. An initial support vector (SV) coincides with a certain clustering center, and its width is equal to the max Euclid distance in the clustering region. Therefore, the initial number of SVs is equal to that of the clustering centers, and different RBF kernels are with different widths. The optimization of SVMs is only to determine

the Lagrange multipliers. The resulting kernel space for optimization becomes relatively lower in dimensionality, and the final SVs are from a part of the clustering centers. The experimental results for the letter and the handwritten digit recognitions show that the proposed methods are effective.Comparison in two input patterns based on SVM, the result shows that SVM method in parallel is highly reliable and accurate. It will have great potential application inclinical diagnosis.

2.4 ANIMAL DISEASE DIAGNOSES EXPERT SYSTEM BASED ON SVM(2014)

Poor condition of disease diagnosis. Generally, it is hard to carry out disease diagnosis rapidly and accurately. But the farms can diagnose animal disease quickly and accurately by the animal disease diagnoses expert system. It could ensure a sound development of the stockbreeding industry. proved the practicality of support vector machine (SVM) which is used in the animal disease diagnoses expert system in theory by studying the disease diagnosis expert system based on SVM.

2.5 NEURAL NETWORKS AND SMO BASED CLASSIFICATION FOR BRAIN TUMOR (2011)

In this model, it exploit the use of Sequential Minimal Optimization (SMO) to

automatically classify brain MRI images either normal or abnormal for tumour. Based on symmetry of brain image, exhibited in the axial and coronal images, it is classified. Using the optimal texture features extracted from normal and tumor regions of MRI by using gray level co-occurrence matrix, SMO classifiers are used to classify and segment the tumor portion in abnormal images. Both the testing and training phase gives the percentage of accuracy on each parameter in SMO, which gives the idea to choose the best one to be used in further works. The results showed outperformance of SMO algorithm when compared to back propagation network with classification accuracy of 88.33% using radial basis function for better convergence and classification.

2.6 POLYHEDRAL CONIC KERNEL-LIKE FUNCTIONS FOR SVMS (2019)

In this study, it proposes a new approach that can be used as a kernel-like function for support vector machines (SVMs) in order to get nonlinear classification surfaces. It combined polyhedral conic functions (PCFs) with the SVM method. To get nonlinear classification surfaces, kernel functions are used with SVMs. However, the parameter selection of the kernel function affects the classification accuracy. Generally, in order to get successful classifiers which can predict

unknown data accurately, best parameters are explored with the grid search method which is computationally expensive. It solved this problem with the proposed method. There is no need to optimize any parameter in the proposed method. It tested the proposed method on three publicly available datasets. Next, the classification accuracies of the proposed method were compared with the linear, radial basis function (RBF), Pearson universal kernel (PUK), and polynomial kernel SVMs. The results are competitive with those of the other methods.

2.7 BRAIN TUMOR DETECTION AND CLASSIFICATION WITH FEED FORWARD BACK-PROP NEURAL NETWORK (2016)

Brain is an organ that controls activities of all the parts of the body. Recognition of automated brain tumor in Magnetic resonance imaging (MRI) is a difficult task due to complexity of size and location variability. This automatic method detects all the type of cancer present in the body. Previous methods for tumor are time consuming and less accurate. In the present work, statistical analysis morphological and thresholding techniques are used to process the images obtained by MRI. Feed-forward back-prop neural network is used to classify the performance of tumors part of the image.

This method results high accuracy and less iterations detection which further reduces the consumption time.

2.8 CNN BASED BRAIN TUMOR DETECTION (2019)

Brain tumor identification is really challenging task in early stages of life. But now it became advanced with various machine learning algorithms. Now a day's issue of brain tumor automatic identification is of great interest. In Order to detect the brain tumor of a patient it consider the data of patients like MRI images of a patient's brain. Here our problem is to identify whether tumor is present in patients brain or not. It is very important to detect the tumors at starting level for a healthy life of a patient. Thereare many literatures on detecting these kinds of brain tumors and improving the detection accuracies. In , it Estimate the brain tumor severity using Convolutional Neural Network algorithm which gives us accurate results.

2.9 PREDICTIVE MODELLING AND ANALYTICS FOR DIABETES USING A MACHINE LEARNING APPROACH (2018)

Diabetes is a major metabolic disorder which can affect entire body system adversely. Undiagnosed diabetes can increase the risk of cardiac stroke, diabetic

nephropathy and other disorders. All over the world millions of people are affected by this disease. Early detection of diabetes is very important to maintain a healthy life. This disease is a reason of global concern as the cases of diabetes are rising rapidly. Machine learning (ML) is a computational method for automatic learning from experience and improves the performance to make more accurate predictions. In the current research we have utilized machine learning technique in Pima Indian diabetes dataset to develop trends and detect patterns with risk factors using R data manipulation tool. To classify the patients into diabetic and non-diabetic we have developed and analyzed five different predictive models using R data manipulation tool. For this purpose we used supervised machine learning algorithms namely linear kernel support vector machine (SVM-linear), radial basis function (RBF) kernel support vector machine, k-nearest neighbour (k-NN), artificial neural network (ANN) and multifactor dimensionality reduction (MDR).

2.10 DIABETES DETECTION USING DEEP LEARNING ALGORITHMS (2018)

Diabetes is a metabolic disease affecting a multitude of people worldwide. Its incidence rates are increasing alarmingly every

year. If untreated, diabetes-relatedcomplications in many vital organs of the body may turn fatal. Early detection of diabetes is very important for timely treatment which can stop the disease progressing to such complications. RR-interval signals known as heart rate variability (HRV) signals (derived from electrocardiogram (ECG) signals) can be effectively used for the non-invasive detection of diabetes. This research paper presents a methodology for classification of diabetic and normal HRV signals using deep learning architectures. We employ long short-term memory (LSTM), convolutional neural network (CNN) and its combinations for extracting complex temporal dynamic features of the input HRV data. These features are passed into support vector machine (SVM) for classification. We have obtained the performance improvement of 0.03% and 0.06% in CNN and CNNLSTM architecture respectively compared to our earlier work without using SVM. The classification system proposed can help the clinicians to diagnose diabetes using ECG signals with a very high accuracy of 95.7%.

2.11 ANALYSIS AND PREDICTION OF DIABETES MELLITUS USING MACHINE LEARNING ALGORITHM (2018)

Data mining techniques (DMTs) are very help full to predict the medical datasets at an early stage to safe human life. Large amount of medical datasets are open in different data sources which used to in the real world application. Machine learningis a prediction on disease data. Currently, Diabetes Disease (DD) is the leading causeof death over all the world. To cluster and predict symptoms in medical data, various data mining techniques were used by different researchers in different time. A total of 768 records, data set from PIDD (Pima Indian Diabetes Data Set) which is access from online source. In the proposed system most known predictive algorithms are applied SVM, Naïve Net, Decision Stump, and Proposed Ensemble method (PEM).An ensemble hybrid model by combining the individual techniques/methods into one we made Proposed Ensemble method (PEM). The proposed ensemble method (PEM) provides high accuracy of 90.36%.

3 SYSTEM STUDY

3.1 EXISTING SYSTEM

One must maintain a delicate balance between insulin injections, diet, and exercise in order to keep the blood sugar at a normal level. The maintenance of this balance requires a great deal of the attention, so occasionally unable to concentrate completely on some activity. One must always be conscious of the sugar level and

be ready to make adjustments if the level is too high or too low. Another problem is that other people do not understand diabetes and have encountered people who think diabetics are sick and cannot lead normal lives.

3.1.1 DRAWBACKS OF THE EXISTING SYSTEM

1. SVM cannot be used for large data sets.

2. SVM is slow in its execution

3. One must maintain a delicate balance between insulin injections, diet, and exercise in order to keep the blood sugar at a normal level.

3.1 PROPOSED SYSTEM

Many researchers have used different classification techniques for MRI tumor data, such as Bayes classifier , k-Nearest Neighbors (kNN) classifier , Artificial Neural Networks (ANN) , Back Propagation Network (BPN), Support Vector Machines (SVMs) and Expectation Maximization(EM) as a statistical classification scheme. For instance, SVM based method for automated segmentation and classification of brain tumor in MRI is proposed.At present, the number of people suffering from heart sickness is on rising. Accurate diagnosis at an early stage accompanied via proper subsequent remedy

can result in sizable existence saving. New data released by the National Heart, Lung and Blood Institute (NHLBI) shows that mainly women in older age groups are more liable to getting heart sickness.

A current study fielded Heart disease can be controlled effectively if it's recognized at an early stage . But it is not smooth to do correct prognosis due to many complex factors of heart diseases. For example, many clinical symptoms are related to many human organs other than the heart and very often coronary heart diseases might also show off various syndromes.

Due to this complexity , there is a need to automate the procedure of scientific diagnosis that may help clinical practitioners in the diagnostic system. To lessen the analysis time and enhance the prognosis accuracy, it has end up extra of a worrying issue to develop reliable and powerful medical decision assist structures to assist the prognosis decision manner. Basically clinical prognosis is complex method, hence the technique for solving this difficulty, is to develop such an smart system, such as Support Vector Machine.

3.2 SVM OPTIMIZATION

Support Vector Machines works by finding a separating hyper plane between two classes of data that maximizes

the margin between the closest data point and the

separating hyper plane by selecting a minimum number of Support Vectors (SVs), which could be determined by solving a Quadratic Programming (QP) optimization problem. The training of the SVM, dominated by the QP optimization, used to be very slow and lacked scalability.

Figure 3.1 Support Vector Network

In device studying, aid vector machines (SVMs, also support vector networks) are supervised studying fashions with related getting to know algorithms that examine records used for classification and regression analysis. Given a set of training examples, each marked as belonging to at least one or the alternative of classes, an SVM training algorithm builds a model that assigns new examples to 1 class or the other, making it a non-probabilistic binary linear classifier (although strategies including Platt scaling exist to apply SVM in a probabilistic classification setting).An SVM model is a representation of the examples as points in space, mapped in order that the examples of the separate categories are divided by a clean gap this is as wide as viable. New examples are then mapped into that same space and anticipated to belong to a class based totally on which aspect of the gap they fall.

In addition to performing linear classification, SVMs can successfully perform a non-linear type using what's called the kernel trick, implicitly mapping their inputs into high- dimensional feature spaces. When data are not categorized, supervised studying is not feasible, and an unsupervised
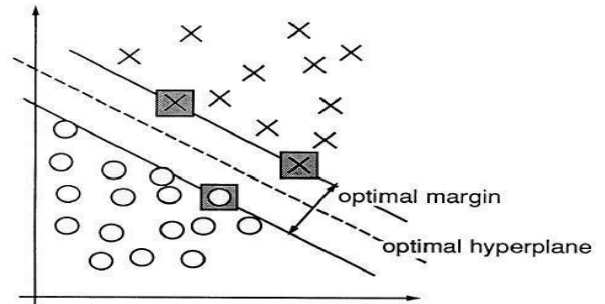
learning approach is required, which attempts to find natural clustering of the data to groups and then map new data to these formed groups. The assist vector clustering algorithm created by means of Hava Siegelmann and Vladimir Vapnik, applies the statistics of support vectors, evolved inside the aid vector machines algorithm, to categorize unlabeled records, and is one of the maximum widely used clustering algorithms in industrial programs.

Diabetes mellitus refers to a set of illnesses that have an effect on how your body uses blood sugar (glucose). Glucose is critical for your health as it's an vital source of electricity for the cells that make up your muscle tissues and tissues. It's also your brain's primary supply of gas.

The underlying motive of diabetes varies by using type. But, regardless of what kind of diabetes you've got, it could lead to excess sugar on your blood. Too a whole lot sugar in your blood can cause critical fitness problems.

Chronic diabetes conditions consist of type 1 diabetes and type 2 diabetes. Potentially reversible diabetes situations include prediabetes when your blood sugar tiers are higher than normal, but no longer high sufficient to be labeled as diabetes and gestational diabetes, which takes place throughout being pregnant however may also remedy after the toddler is introduced.

3.3 SYMPTOMS

Diabetes signs vary relying on how your blood sugar is increased. Some human beings, especially those with prediabetes or type two diabetes, may not enjoy signs and symptoms in the beginning. In kind 1 diabetes, signs and symptoms have a tendency to come on quickly and be more intense.

Some of the symptoms and signs and symptoms of type 1 and type 2 diabetes are:

- Increased thirst
- Frequent urination
- Extreme starvation
- Unexplained weight loss
- Presence of ketones

inside the urine (ketones are a byproduct of the breakdown of muscle and fats that occurs while there's not sufficient available insulin)

- Fatigue
- Irritability
- Blurred vision
- Slow-recuperation sores

Frequent infections, which include gums or pores and skin infections and vaginal infections

Type 1 diabetes can expand at any age, although it frequently appears for the duration of formative years or early life.

Type 2 diabetes, the more not unusual kind, can develop at any age, though it's more commonplace in people older than 40. Support Vector Machines (SVM) a new type of learning machine, based on statistical learning theory developed by Vapnik[3], has gained popularity due to its promising empirical performance. Linear Support Vector Machine (SVM) classifier is one of the best linear

classifiers because it finds the hyperplane which maximizes the separating margin between classes. But for classification of tumour and normal pixels with many features, a need for non-linear classifier i.e kernel SVM classifier is required. The linear SVM can be readily extended to a nonlinear classifier by first using a nonlinear operator (.) to map the input pattern x into a higher dimensional space

H. Non-linear Support Vector Machine (SVM) has been widely used in many applications, from text categorization to protein classification.

Figure 3.2 Data Classification and the SVM QP problem

Disorders associated with Diabetes

Diabetic Retinopathy- This is the situation where retina of the eyes is affected because of the pro-longed effect of the diabetes. At the initial stage, blur vision is noticed. Gradually, hard exudes are developed at retina that can also muscles to bleed. Hence, it will certainly lead to vision loss.

Diabetic Neuropathy-It deals with the problem of nerve damage due to excess sugar. Neuropathy deals with the damage of often foot -nerves. As a result, it is

advised that Diabetic patients should walk with great precautions.

Malfunctioning of Liver- Liver is highly affected by high blood glucose as it is not able to synthesize bile juice properly. Hence, digestive system is affected by this. Liver shows indigestion problems as early signs first of damage but in worst case, liver paralysis occurs.

Stomach paralysis or Gastro paresis- The worst effect of Diabetes is nerve damage of stomach. It is just like Neuropathy, damage of nerves. Due
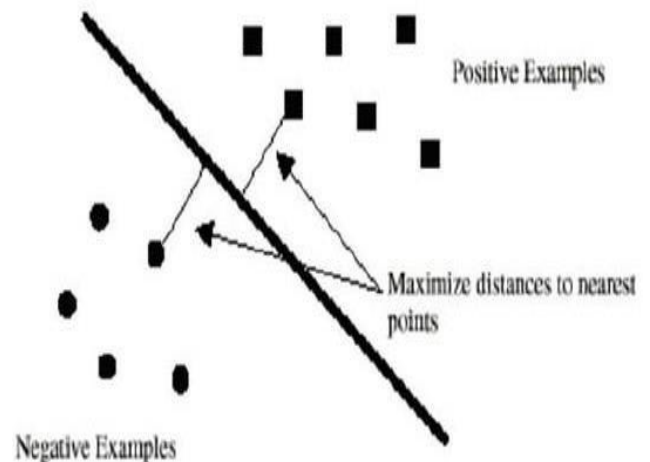
to this damage, there is feeling of nausea, bloating, indigestion even though small amount of food is eaten.

PCOD -This is the most alarming disorder that is frequently occurring in Women. It can affect teenagers female also. It mainly occurs due to high insulin in the blood. This led to development of multiple

Cysts in the ovaries. This can cause weight gain, excessive hair growth on face, acne and in worst case ovarian cancer can be developed. Hence, chances of being pregnant decrease gradually

3.4 SVM TRAINING ALGORITHM

Step 1: Input C, kernel, kernel parameters, and epsilon.

Step 2: Initialize $\alpha i = 0$ and $b = 0$

Step 3: Let $f(x) = b +$ and τ

$$f(x) = b + \sum_{i=1}^{m} y_i \alpha_i k(x, x_i)$$ the tolerance.

Step 4: Find Lagrange multiplier αi, which violates KKT optimization.

Step 5: Choose second multiplier and optimize pair. Repeat steps 4 and 5 till convergence.

Step 6: Update $\alpha 1$ and $\alpha 2$ in one step. $\alpha 1$ can be changed to increase $f(x1)$. $\alpha 2$ can be changed to Decrease $f(x2)$.

Step 7: Compute new bias weight b.

3.5 ANALYSIS OF THE DISEASES

At present, the number of people suffering from heart disease is on rising. Accurate diagnosis at an early stage observed by using right treatment can result in subsequent life saving. New data launched with the aid of the National Heart, Lungand

Blood Institute (NHLBI) shows that specifically ladies in older age groups are more vulnerable to getting heart sickness. A latest observe fielded Heart disease can be controlled efficiently if it's diagnosed at an early stage . But it's no longer smooth to do accurate prognosis because of many complex factors of heart diseases. For example, many clinical symptoms are related to many human organs different than the coronary heart and very often coronary heart diseases may additionally exhibit various syndromes.

Due to this complexity, there is a want to automate the procedure of medical prognosis which can help clinical practitioners in the diagnostic manner. To lessen the prognosis time and enhance the prognosis accuracy, it has emerge as greater of a stressful issue to expand reliable and powerful clinical selection guide structures to help the analysis choice manner. Basically medical diagnosis is complex system, hence the approach for fixing this problem, inclusive of Support Vector Machine.

Application to Clinical Diagnosis of Cardiac Disease

The electrocardiogram is today used worldwide as a relatively simple way of diagnosing heart conditions. An ECG is a recording of the small electric waves being generated during heart activity. An

ECG intervals and waves are shown in Fig. 2. This diagram illustrates ECG waves and intervals as well as standard time and voltage measures on the ECG paper. The P wave represents atrial activation; the PR interval is the time from onset of atrial activation to onset of ventricular activation. The QRS complex represents ventricular activation; the QRS duration is the duration of ventricular activation. The ST-T wave represents ventricular repolarization. The QT interval is the duration of ventricular activation and recovery. The U wave probably represents "after depolarizations" in the ventricles.

The data are from LDS Hospital in Salt Lake City provided by Frank G.Yanowitz of University of Utah School of ECG Department. Most of the 12- and 6- lead ECGs were recorded at LDS Hospital in Salt Lake City, Utah. Marquette Electronics has also given permission to use ECG rhythms and diagrams from their educational posters. Each of the ECGs has an interpretation and many have additional explanations that help explain the diagnosis There are 8 leads after the transform of ordinary 12- lead ECG. Every one notes the signal of ECG in 10 seconds. In the original data, every lead include 5000 samples, so every swatch has (8×5000) data. For the difference of individual and heartbeat frequency, the

extracted full heartbeat samples are difference from one another. For the effective pattern classification, the original input data must be transformed to get the classified information.

3.2.1 ADVANTAGES OF THE PROPOSED SYSTEM

- SVM is used to classify diabetes data set effectively by assigning data setinto various categories with the help of the hyper plane.

- It removes over fit nature of the samples.

- In some ways the problems involved with diabetes have made me moredetermined.

4. SYSTEM MODULES

4.1 MODULES

- KNN Algorithm

- Parallel Decision Model Based on SVM

- Clinical Diagnosis of Cardiac Disease

- Diabetic Neuropathy

- Diabetic Retinopathy

4.1.1   KNN ALGORITHM

K nearest neighbors is a simple **algorithm** that stores all available

cases and classifies new cases based on a similarity measure (e.g., distance functions). In pattern recognition, the **k-nearest** neighbors algorithm (**k-NN**) is a non-parametric methodused for classification and regression. ... If **k** = 1, then the object is simply assigned to the class of that single **nearest** neighbor.

Pick a vertex and apply the Nearest Neighbor Algorithm with the vertex you picked as the starting vertex.

Repeat the algorithm (Nearest Neighbor Algorithm) for each vertex of the graph.Pick the best of all the Hamilton circuits you got on Steps 1 and 2.

4.1.2 PARALLEL DECISION MODEL BASED ON SVM

The structure of SVM is classifier, the structure of SVM consists of three layers.The first layer is input layer. The second layer is support vector, i.e. hidden layer, and the third layer is output layer.

4.1.3 CLINICAL DIAGNOSIS OF CARDIAC DISEASE

4.2 SYSTEM DESIGN

The electrocardiogram is today used worldwide as a relatively simple way of diagnosing heart conditions. An ECG is a recording of the small electric waves being generated during heart activity. An ECG intervals and waves are shown in This diagram illustrates ECG waves and intervals as well as standard time and voltage measures.

4.1.4 DIABETIC NEUROPATHY

These are the nerve disorders developed in diabetic patients with the passage of time. They often occur in foot and hands. The common symptoms are pain, numbness, tingling, loss of feeling in hand, foot, arms etc.

4.1.5 DIABETIC RETINOPATHY

It is the diabetic disorder that leads to permanent eye blindness. Initially there is no significant symptom, gradually symptoms are seen. In the second stage, blood vessels are developed at the back of the eyes that could lead to bleeding on bursting as they are quite agile.

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

4.2.1 ARCHITECTURE DIAGRAM

Cardiovascular disease is the leading global cause of death. System will help to predict Diabetics disease depending on the patient's ECG values and medical Dataset of the patients and SVM classifier.
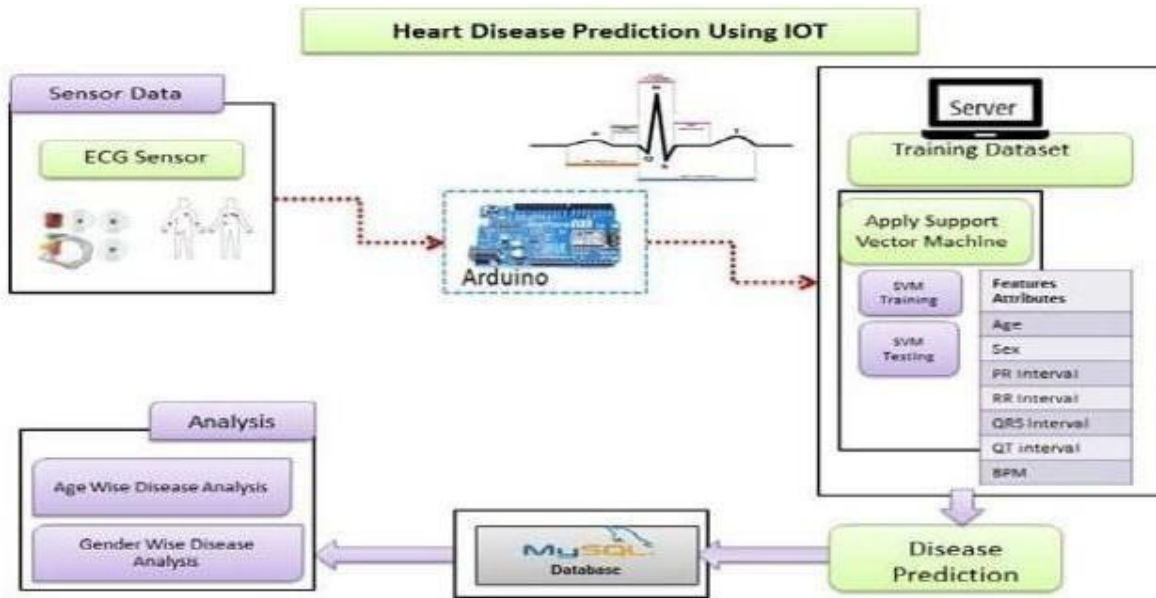
Figure 4.1 Architecture Diagram

The Health Fog model is an IoT based fog-enabled cloud computing model for healthcare, which can manage the data of Diabetics patients effectively and diagnose the health status to identify Diabetics disease severity. Health Fog integrates diverse hardware instruments through software components and allows structured and seamless end-to-end integration of Edge-Fog-Cloud for fast and accurate delivery of results. presents the architecture of Health Fog which comprises of various hardware and software components that are described next.

4.2.2   FLOW DIAGRAM
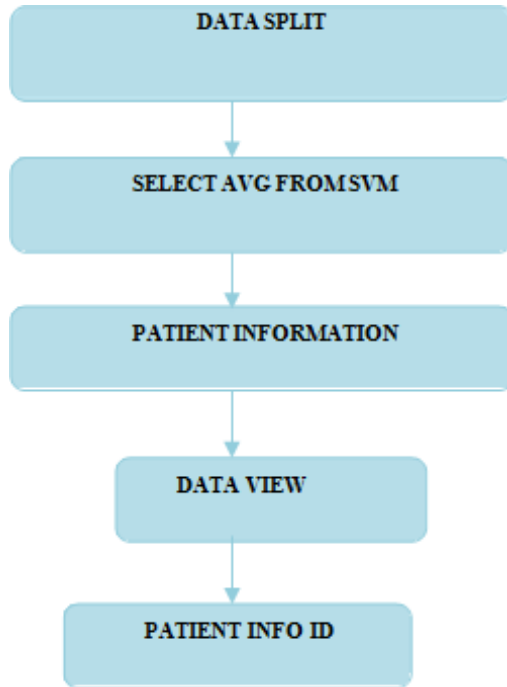
5. CONCLUSION AND FUTURE ENHANCEMENT

5.1 CONCLUSION

Diabetics disease prediction is a popular exploration area in computer vision. The parameter on which Diabetics disease is mostly dependent is extremely susceptible and variant. So getting historical information about the patient we can predict the Diabetics disease In this paper, we give a brief review of different methodology in the prediction of Ventricular Arrhythmia disease detection. A large collection of methods are identified for recognition of Diabetics disease. but none of the can give 100% accuracy in the prediction. So there is a need to develop a system which can predict the Diabetics

disease with higher accuracy.

5.2 FUTURE ENHANCEMENT

The research work presented in this article focuses on retrospection of Edge and Fog computing applications in healthcare. These jargons are associated with Cloud computing and named according to their architectural relationship. Various applications can function more effectively using Edge and Fog level rather than migrating to the Cloud. This is for various factors like nature of client, data locality, grid system overhead, device and cloud resources and their availability etc. The main intention remains to make the service available in all types of circumstances. It has been found that various healthcare related applications are more applicable for execution in Edge and Fog rather than Cloud for its solution to the various constraints of the various sensors. However, the review depicts that a massive computation which happens in healthcare applications need to be processed in a layer that exist between the sensor network and the cloud. The articles reviewed here also show that all the network layers have potential to get involved in computation work. Apart from this, we also have highlighted the trade-off when allocating computational task to the levels of the network and discussed the

challenges and security issues of fog and edge computing related to healthcare applications. Though the sensor devices are not powerful enough for performing the computation task, they overcome this limitation byoffloading the computation task. In addition, due to some restrictions, cloud computing is not an efficient solution for such offloading. But, the flexibility of fog computing allows to induct computation as a part of the network infrastructure, therefore regarded as a most appropriate solution for healthcare.

Until currently, data results of the SVM class set of rules in comparison to the ANN type, are very encouraging. The distinction in the accuracy is major. Moreover, the difference inside the execution instances is even extra noteworthy. The stronger performance of the SVM classification is that they could keep away from repetitive searches so one can discover the quality two factors to use for every optimization step.

It is discovered that SMO plays better with high accuracy while the statistics is preprocessed and given as enter. Applied to the undertaking of fixing classification trouble of heart ailment and the features extracted primarily based on

statistical houses, the accuracy is higher inproposed SVM category model which uses SMO.

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DOMESTIC ANIMAL MANAGEMENT FOR FARMERSUSING ANDROID APPLICATION

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Abstract : The purpose of this project is to determine the role and function of the information system application in helping thesale of livestock products to farmers so that it can help improve community empowerment and economy. One of them is regarding the application of information systems, which are applications in animal husbandry. This study uses descriptive methods to collect data and describe the problems faced by the community in implementing Android-based application information systems in improving the quality of sales in the field of animal husbandry in the city. The results showed that the application became one of the media used by the community to improve the outcomes and quality of sales in the livestock sector, one of which was the Selling Cattle application. This application will undoubtedly facilitate the community in selling community livestock to increase people's income.

INTRODUCTION

As a country that is in the process to become a developed country, Indonesia needs to build an economy based on Human Resources (HR) and technology-based innovation. The strategy is to reduce dependency on the exploitation of natural resources, improve the quality of human resources, and increase the number of entrepreneurs [1]. Sales transactions are one of the things that can be utilized in business decision making. Most of the sales transaction data are not used to the maximum extent possible, and only stored and only used to make a sales report without taking any approach [2]. On the contrary, there is a study that has applied a transaction cost approach to marketing livestock among farmers in South Africa, to test the effect of information, negotiation, and monitoring costs on selling animals on farms to buyers or consumers. The theoretical predictions of the economy of this transaction have been tested based on primary data collected from 230 livestock farmers on cattle farmsin 13 communities in one of the cities located in Africa [3]. For some factors that are compatible with livestock marketing and besides, livestock farmer participation in the formal market is reduced. Therefore, after researching the cause, the majority of farmers prefer the informal market (56.4%) than the official market (43.6%) [4]. In research conducted in Indonesia, livestock on livestock has ahigh potential, especially in one of the animal which is cattle. Data from the 2011 Agricultural Census stated that cattle reached 14.8 million of population, and the majority for local species, namely Bali cattle, has the amount of 4.8 million (32.31%) [5]. Therefore, the contribution of livestock income, especially cattle to smallholder households, ranges from 15% to 26% [6]. However, the livestock industry has conducted research studies on collaborative practices affecting the income of smalllivestock is still rare [7]. Many previous studies have paid more attention to the types and

characteristics of collaborative practices in livestock
supply chains[8].

OBJECTIVES

This project aims to find out the role of Android-basedapplication information systems in helping the sale oflivestock farmers so that they can also help the community's economy, especially livestock farmers. Regarding the applications of information system that are android-based applications in the field of animal husbandry, this research uses descriptive methods in gathering data and describing problems that have been faced by the community. Therefore, this application information system will be able to improve the quality of sales in the field of animal husbandry, in this application contain programs that can facilitate the community to become an entrepreneur, at least the government can find out the economic development of its people, because entrepreneurs will be the cogs for the economy in each region, be it in districts, municipalities, provinces and for the country. The purpose of this research is to find out whether the socialization using applications that are android-based can help in promoting application programs that can facilitate livestock farmers in selling their livestock products.

EXISTING SYSTEM

The existing proposed system does not provide the any health care support to the user. This is fully based on advertisement of product for farming. No detailed information about health care for livestock were not available in the application. No subsidy details for livestock not available. Nutrition like feeding and health care support management for livestock were not provided. While analysing this existing system we found that it has some modules like medical care for some disease, animal purchase with breeds and nutrition for cattle. In view of user this in not enough to maintain livestock with good profitable way. It does not provide multi language support for user. The subsidy like government schemes are not provided in this application and also does not provide infrastructure support. It is not detailed and short in content. Its merely an introduction. Most of the existing system has a single animal management. The existing system does not provide sufficient information about infrastructure. The benefits provided by the Government is not available in the existing system The precautionary methods are not present in the existing system. Schemes for livestock management were not provided.

PROBLEM STATEMENT

The major problem faced by livestock farmers todayis the limited knowledge in field of animal husbandry. It will be in various forms which will have emergency needs, healthcare needs. If a new person is entering the field of animal husbandry the knowledge requirement for handling the livestock animals is basic thing needed by that person. The field of animal husbandry is not aware among most people in the country. The information should be in a easy understanding way where the live stock farmers can adapt to it easily. The solution to this challenge requires the implementation of various technologies in a single platform. The platform where the information about livestock will be provided. The last decade has seen major improvements, including automated feeding systems, milking robots, and manure management, and maximizing production efficiency through instrumentation, animal breeding, genetics, and nutrition. Despite this progress, significant challenges remain. Intensive livestock management is necessary to meet the increasing demand for animal products, but the confined and crowded nature of livestock housing makes it difficult for farmers to closely monitor animal health and welfare. As climate change intensifies, the risk of disease, heat stress, and other health issues among livestock animals will increase. This in turn will create a greater urgency to identify health issues and disease outbreaks preemptively or early on, understand disease transmission, and take preventative measures to avoid large-scale economic losses . These issues, as well as escalating concerns over animal welfare, transparency, and environmental sustainability, have led to growing interest in digitalizing livestock agriculture through precision livestock farming technologies

Proposed Solution:

The major problem faced by livestock farmers today is the limited knowledge in field of animal husbandry. It will be in various forms which will have emergency needs, healthcare needs. If a new person is entering the field of animal husbandry the knowledge requirement for handling the livestock animals is basic thing needed by that person. The field of animal husbandry is not aware among most people in the country. The information should be in a easy understanding way where the live stock farmers can adapt to it easily. The solution to this challenge requires the implementation of various technologies in a single platform. The platform where the information about livestock will be provided.

Software Tools:

Android Studio:

Android Studio provides a unified environment where we can build apps for Android phones. Structured code modules allow you to divide your project into units of functionality that you can independently build, test, and debug. It is very easy to develop an Android Application. In our proposed system, we use Android studio as development tool for implementing project. It is easy to create User Interface and connecting with real time database is done with plugins and Application Programming Interface (API) are easy for integration in Android Studio.

Figma:

Figma is a design tool that lets you create designs for mobile and web interfaces, or any other kind of design you can think of. Figma is a collaboration tool for teams and individuals to create and share high-quality work. The main User Interface design and work flow of our proposed system are done by Figma platform. Because it very light, simple and elegant for team work, also very simple to learn in short period of time.

Flutter:

Flutter is an open-source User Interface software development kit created by Google. It is used to develop cross platform applications for Android. All User Interface development are created in Flutter and are converted into code using some plugins in Android Studio. Easy building for UI and implementation in Flutter is done with help of Dart programming language.

Java:

There are many programming languages for building an application in Android studio. But in our proposed system we go with java for the backend development. Because of its multi-platform support and security for user data. Java Database connectivity helps to connect with database over internet in easy manner for storing, accessing and working with data.

Firebase:

Firebase is a set of hosting services for any type of application for Backend connectivity with Database. It offers real-time hosting of databases, content and notifications, or services, such as a real-time communication server. Updating of details of each data will be accessed by the user for in real time without any further updation of android application.

CONCLUSION

The development of information system technology will increase rapidly, so that makes the government look for solutions and ways to improve the economy in animal husbandry by utilizing the application of information system technology in the form of apps. This applicationcan speed up the economic level of livestock farmers, one of which is a program that can facilitate the community and develop the community to become an entrepreneur. Where an increase in entrepreneurship in a country will also improve the country's economy. Socialization is one of the most effective ways because, in addition to being more comfortable and faster, it can be quickly understood by the community, and if there arepeople who forget or are unable to attend during direct socialization, they can find out the information through the application or website.

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ELEGANT CITIES USING IOT

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Abstract

Smart cities have been outfitted with various electronic devices based on the Internet of Things (IOT) and have become smarter than before as a result of the ongoing breakthroughs in sophisticated metering and digital technologies. This article's goal is to give a thorough overview of the ideas behind smart cities, as well as their purposes and uses. Additionally, this survey discusses the key elements and characteristics of a smart city as well as IOT technologies for smart cities. Additionally, the fundamental obstacles are highlighted along with real-world examples from throughout the globe.

Introduction

The term "Internet of Things" (IOT) refers to a technology that allows physical items, or "things," to interact with one another and with internetworking devices and applications. IOT can be defined as "a network of physical things (objects) sending, receiving, or communicating information using the Internet or other communication technologies and network just as the computers, tablets, and mobiles do, and thus enabling the monitoring, coordinating, or controlling process across the Internet or another data network." Another source defines the word IOT as "the network of physical objects or 'things' integrated with electronics, software, sensors, and connection to enable them to attain better value and service by exchanging data with the manufacturer,

operator, and/or other connected devices. The Internet of Things (IOT) is an advanced automation and analytics system that deals with artificial intelligence, sensor, networking, electronic, cloud infrastructure. IOT systems have better performance, control, and transparency. By enhancing parts of our lives with the power of data collecting, AI algorithms, and networks, IOT makes almost everything "smart." The Internet of Things (IOT) is a network of networked computing devices that are implanted in commonplace things and allow them to send and receive data. Things categorised as identity communication devices served as the foundation for the IOT idea. An identity communication device is a radio frequency identification device (RFID). For future identification, items are tagged to these devices. Using remote computers .

messaging, etc. to deliver complete systems for the product or services. Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing Internet connected through the Internet, these items may be followed, managed, and monitored. Machine-to-machine (M2M) communication, connected autos, wearable and personal device communication, and Industry 4.0 are just a few examples of what the idea of IoT makes possible. Smart cities are now a reality thanks to IOT principles, and autonomous vehicles could soon be able to drive themselves. IOT devices' ability to generate a lot of data is one of their most intriguing features. Applications like artificial intelligence and machine learning are well suited for this. Without a human being getting involved, IOT can communicate

IOT ARCHITECTURAL VIEW AND FRAMEWORK

There are several tiers in an IOT system. These levels are also referred to as tiers. Building blocks, subsequent interactions, and integration can all be represented using models. The use of internet of things is expanding quickly and has a wide range

of applications. The Internet of Things functions as intended/developed depending on the many application areas. However, it does not have a consistently adhered-to standard defined architecture of working. The functioning and application of IOT in

various industries determine its is still based on a fundamental industrial flow. The 4 Stage IOT Architecture is the basic IOT architecture. Therefore, it is evident from the graphic below that there architecture. IOT are four layers, which may be further classified into the following categories:

* Sensing layer,

* Network layer,

* Data processing layer and

* Application layer.
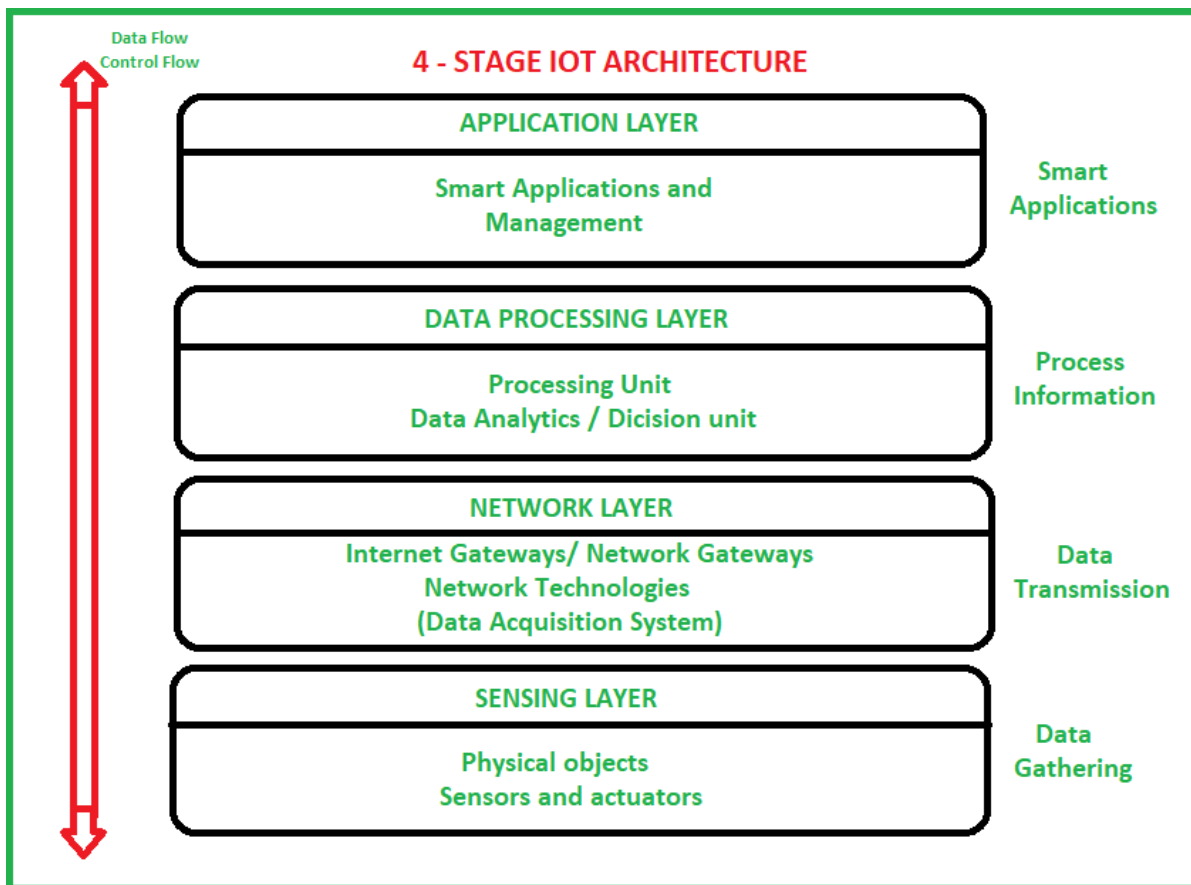
- Sensing Layer -This layer contains sensors, actuators, and devices. These sensors or actuators receive data (physical and environmental factors), process the data, and then transmit the data across a network.

- Network Layer -This layer includes Internet/Network gateways and Data Acquisition Systems (DAS). Data gathering and conversion tasks are handled by DAS (Collecting data and aggregating

data then converting analogue data

- Advanced gateways, which primarily connect Sensor networks to the Internet, also carry out numerous fundamental gateway functions, such as malware protection, filtering, and sometimes decision-making based on inputted data and data management services.

- Data processing Layer -This is the IOT ecosystem's processing layer. Before being sent to the data centre, where it is accessed by software programmes commonly referred to as business applications, the data is first pre-processed and examined here before being ready for further action. Edge IT or edge analytics enter the picture here.

of sensors to digital data etc).

- Application Layer -The fourth and final step of the IOT architecture is this layer. Data centres or the cloud are places where data is managed and used by end users for things like agriculture, healthcare, aerospace, farming, and military.

IOT architecture might actually differ greatly depending on the implementation; it needs to be sufficiently open with open protocols in order to allow a variety of network applications. Functionality, scalability, availability, and maintainability are the four foundational elements of a sustainable Internet of Things ecosystem. Scalability is essential since the system must be able to expand to meet the demands of the project or organisation.
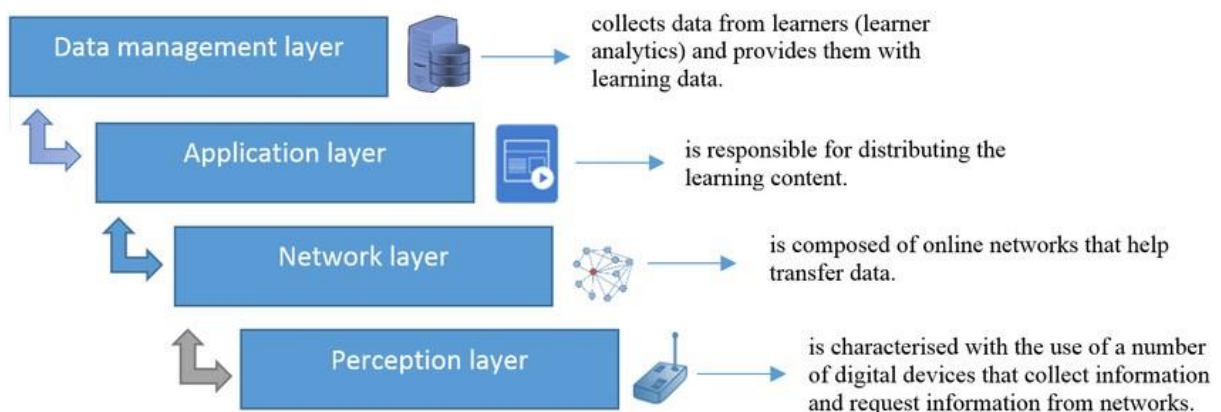
FRAMEWORK:

The Internet of Things (IOT) Framework is a network of interconnected devices that communicate with one another via the Internet. These Internet-connected devices often function to send and sense data while requiring limited human involvement. The Internet of Things (IOT) framework enables seamless communication between linked devices. Therefore, this should come as no surprise that it is known as the "Internet of Things" framework, or, to put it another way, the framework that makes it possible for devices to communicate with one another over the Internet. The Internet of Things framework, which has applications in practically every industry, is a crucial component of technology in the present world. The design of smart homes, for instance, is one of the IOT's key applications. Among many other physical objects, the IOT framework concept is also used in the design of thermostats, electrical equipment, security and alarm systems, vending machines, and other items.
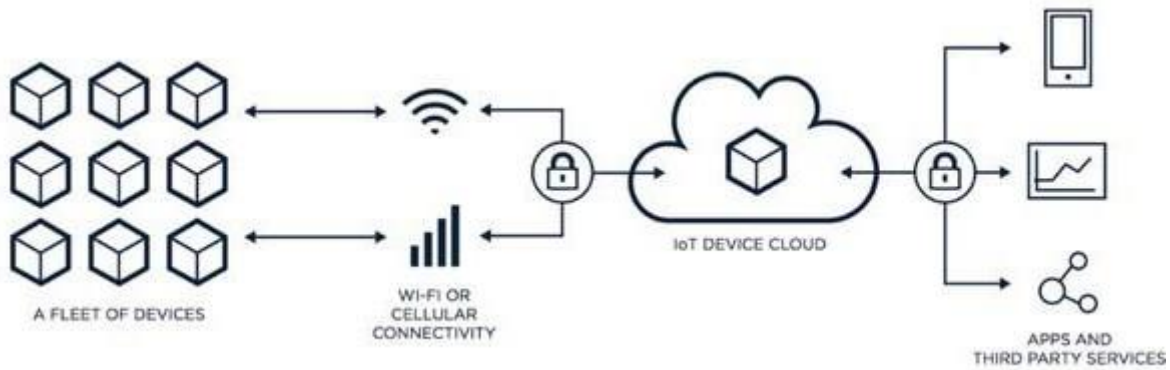
IOT FRAMEWORK OVER VIEW

Main Components of the Internet of Things Framework
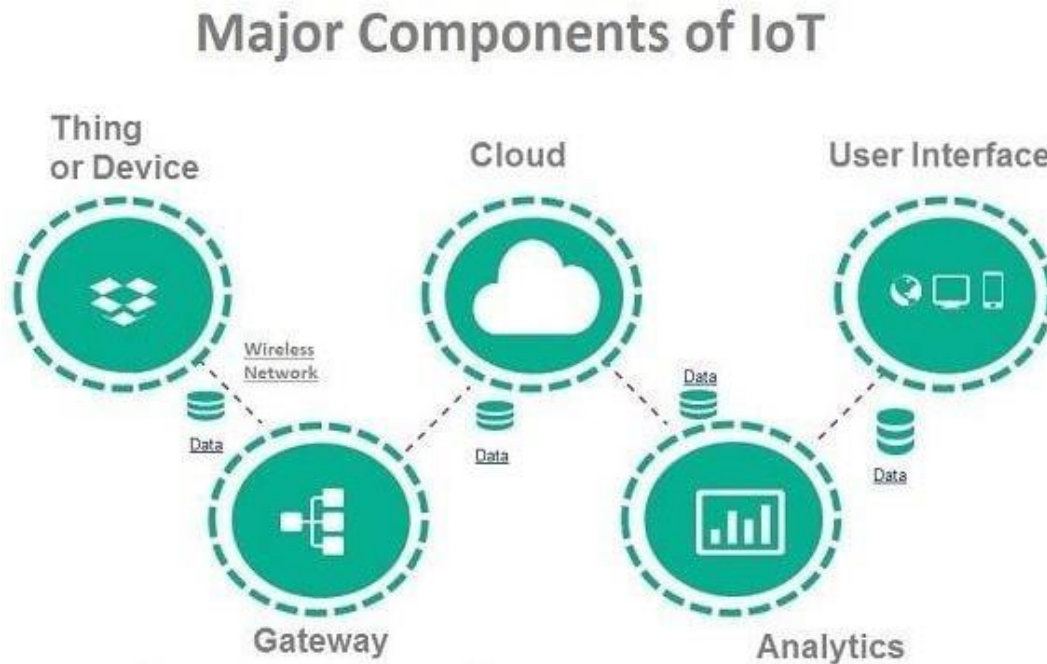
The IOT Framework is made up of four main parts, which are detailed below:

1) Device Hardware -The IOT Framework's device hardware part necessitates a fundamental understanding of architecture. Additionally, the user must be familiar with how the various micro-controllers and sensors operate.

Sensors, microcontrollers, and controllers are a few examples of hardware devices that make up this IOT framework component.

2) Device Software - The provided writing apps must be used to set up the controller and remotely operate the devices in order for the framework's device software to operate as intended. The user must have a fundamental understanding of how libraries are typically created for programming, as well as how API functions inside microcontrollers.

3) Communication and Cloud Platform - One of the most essential components of the IOT framework is the cloud platform. It requires a fundamental understanding of both wired and wireless communication. The user must be well-versed in both the operation of cloud technologies and IOT integration. In conclusion, we can state that the IOT Framework's communication and Cloud Platform are where all conversations take place.

4) Cloud Application - The cloud application is a type of software program that primarily consists of components that may be accessed relatively easily and quickly. These components may be local or even based in the cloud. The cloud application strives to enhance the system so that its full potential is reached.

In other words, the cloud application is the written implementation of an IOT framework that connects all local hardware devices and cloud-based devices.

ADVANCEMENT IN CITIES USING IOT

Smart city efforts are being made possible worldwide thanks to the alluring IOT services and big data analytics. By enhancing infrastructure and transportation systems, lowering traffic congestion, managing trash, and enhancing human life ansportation, and public safety, make up smart infrastructures. They set up and manage "cyber-physical systems," which are pieces of data-controlled machinery that communicate with the real

quality, these services are altering cities. In order to present a general overview of the IOT paradigm for smart cities, integrated ICT, network types, potential prospects, and key requirements, we developed a taxonomy for this article. Additionally, a summary of the most recent initiatives from standard bodies is provided. Following numerous illustrative case studies, we provide an overview of the open-source IOT platforms currently available for implementing smart city applications. Additionally, we provide a summary of the most recent global collaborations and initiatives made to advance IOT in the context of smart cities.

SMART INFRASTRUCTURE

Multiple operators from various industries, such as energy, public tr

environment. Depending on their maturity level, they cooperate and share information under a variety of systems.

FLOW CHART :
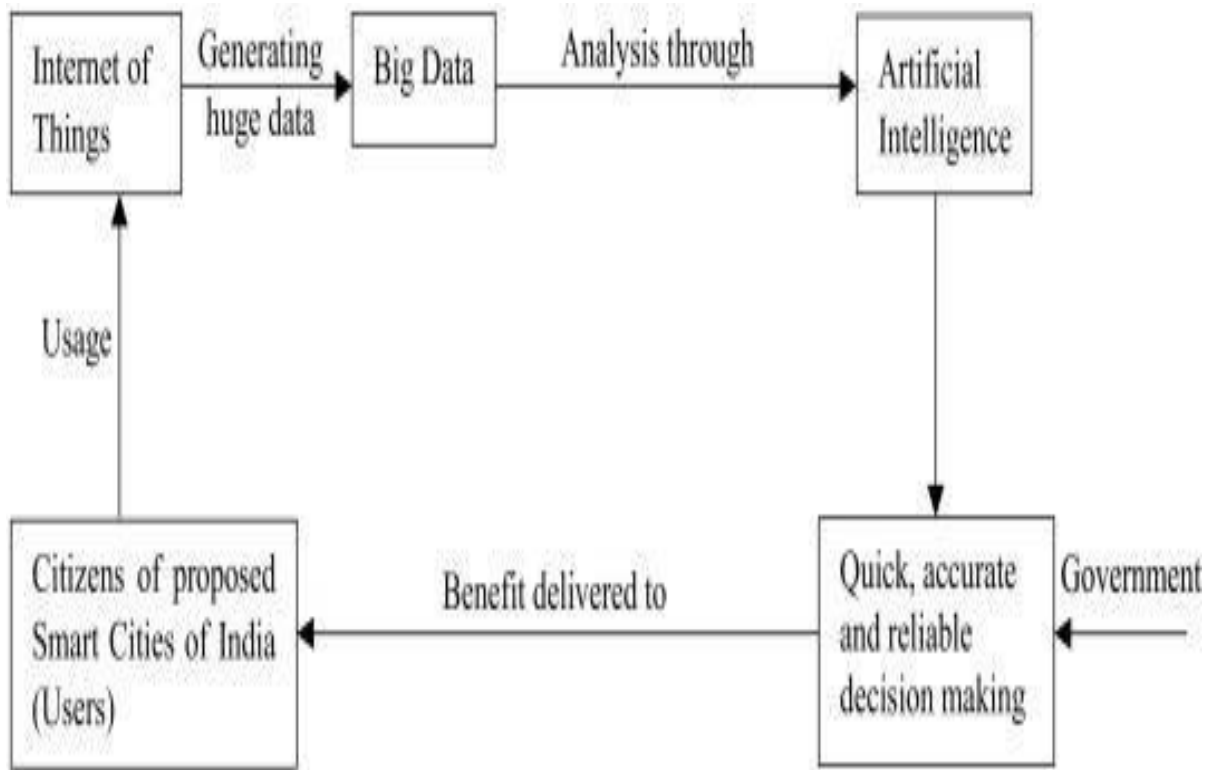
USES :

IoT Intelligent Applications are ready-made software-as-a-service (SaaS) programs that can examine and display IoT sensor data to corporate users via dashboards. IoT Intelligent Applications are available in their entirety. Machine learning techniques are used by IoT apps to analyze volumes of linked sensor data in the cloud. Key performance metrics, statistics for mean time between failures, and other data are all visible through real-

.

time IoT dashboards and notifications. Machine learning-based algorithms are able to spot abnormalities in equipment, notify users, and even start automated repairs or preventative steps. Business users who deploy cloud-based IoT apps can quickly improve the way that supply chains, customer service, human resources, and financial services are currently run. Complete business processes don't need to be   redone

METHODOLOGY :

of physical assets.

Businesses can rapidly locate assets thanks to tracking. They can ensure that high-value assets are safeguarded against theft and removal by A wide range of applications is being driven by IOT's capacity to both enable and deliver sensor data as well as device-to-device communication. The most well-known programs and their functions are listed below.

Utilize machine monitoring andproduct-quality monitoring to increase manufacturing efficiencies.

To ensure that machines are operating within the necessary tolerances, they can be continuously evaluated and monitored. Real-time product monitoring is another option for finding and fixing quality issues.

Enhance the "ring-fencing" and tracking using ring-fencing.

Monitor environmental factors and human health analytics via wearables.

SMART WATER

Water leaks in water distribution networks are addressed by continuously monitoring the network infrastructures with smart

IoT wearables make it possible for patients to be monitored remotely by doctors and for people to understand their own health better. Additionally, thanks to technology, businesses can keep tabs on the well-being and safety of their personnel, which is particularly helpful for those who operate in dangerous environments.

Improve current procedures and open up new opportunities.

As an illustration, consider how connected logistics for fleet management uses IoT to improve productivity and security. To increase productivity, businesses can leverage real-time realignment of trucks via IOT fleet monitoring.

Enable adjustments to business processes.

A good illustration of this is the usage of IoT devices for connected assets to keep tabs on the health of distant machines and initiate service calls for repair. New product-as-a-service business models, in which consumers no longer must purchase a thing but rather pay for its use, are also made possible by the capacity to remotely monitor device.

sensors that are strategically positioned on relevant net pipes. The authors' suggested methodology include measuring the radial vibrational condition of appropriate network pipes in order to locate leaks with adequate accuracy. The hypothesis

is based on the hypothesis that the energy variation conveyed to the pipe walls by the radial component of the vibrations caused by the fluid's turbulence onto them may be connected to the flow leak itself. This article describes the planned Smart Water Grid's (SWG) topology and develops a monitoring process starting with an inventive leak detection system.

USES :

- Enhanced water consumption monitoring
- More accurate water bills
- Easier & faster leak detection and repair
- Higher water and energy savings
- Lowered environmental impact

SMART BUILDING

System Facility management plays a key role in the design and development of smart

cities and buildings. Data-driven fault detection and diagnosis (FDD) methods, which refer to

the newer generation of AI-enabled classification methods, such as data science analysis, big

data, Internet of things (IoT), industry 4.0, etc.., are becoming more and more crucial. The

interpretability of those methods does not considerably improve, despite the fact that data-

driven FDD methods now exceed the bulk of conventional FDD approaches, both the

physically based models and mathematically base models, in terms of both efficiency and

accuracy. Instead, the literature search found that the biggest issue preventing the adoption of

data-driven FDD approaches in practical industrial applications is their interpretability.

USES :

In order to optimize the indoor air quality and illumination levels for your occupants, smart buildings provide the sophisticated capacity to control important environmental parameters like room temperature and lighting. To create the optimum circumstances possible, variables like carbon dioxide detection and ventilation flow can be measured.

SMART HEALTH

The main idea behind a smart health ecosystem is to integrate various smart consumer and

medical devices as well as smart city infrastructures. This will allow for the continuous

collection of data from daily life, which will then be analysed to gather the evidence required

to provide customised interventions. In order to gather data (such as medical history) that may

need to be taken into account when making decisions about interventions, mobile platforms are

typically connected to the systems of healthcare service providers. More data is now available

for analytics thanks to connected devices, which necessitates new techniques for handling

massive amounts of data and deriving insight from unstructured datasets.

Machine learning and big data technologies are the best option in this regard

for handling and analysing continuous data streams in enormous volumes5 and for making sure

that providers are given meaningful insights without having their operations slowed down. By

es the determination of the medical conditions to be targeted, the associated clinical trial protocols, the WHO recommendations or other institutional recommendations to be taken into account, the quality of life standards24 that establish the assessment baselines, the SotA in quantitative sensory testing,25 and

2. Requirement integration.. The elicited needs must first be examined to establish the consistency of the various claims before being accepted as valid. All of these efforts propel an integration stage designed to produce a consistent list of need specifications that were derived from stakeholder and solution

regularly taking requirements from various sectors into account when designing a smart health

solution, the matching smart health requirements (MSHR) methodology is used. Considering

user, technological, and organisational requirements, our goal is to support a variety of

requirements elicitation approaches. putting needs in order of importance and choosing the best

solution on the market.

MSHR is organized into four phases.

1. A domain analysis. This stage is created to survey the state of the art, which identifies an initial set of specifications the project must meet. This includ other normative conditions like legal, ethical, and privacy regulations. 26 The output of this phase is a set of background requirements that are often applicable to numerous projects and will be merged with the stakeholder and solution needs elicited in the next phases.

requirements but were more precisely stated. For instance, if the overall objective is to monitor a patient's emotional changes, one objective would be to monitor such changes daily or weekly. Another objective might be to avoid negatively affecting user acceptance by using too many surveys.

3. gathering requirements. This phase comprises the elicitation of Stakeholder and Solutionrequirements of both Functional or non-Functional type. Different elicitation approaches are acceptable for various domains of analysis, but our methodology only considers two key categories: clinical requirements and technological requirements.

4. Solution selection. It is required to assess the technological solutions that could be able to satisfy the needs after the requirements have been determined and arranged into a consistent set of specifications. This comprises hardware, networks, and software that must be characterised in terms of features using the same scale levels

established for requirement objectives by drawing on the objective knowledge of specialists and factual data. The designers must also translate the required specifications into quantifiable levels in order to set the goal objective levels. The goal is to comprehend the degree of fulfilment each solution is capable of providing. As a result, the priorities that will guide the development process are implicitly identified. Multi-criteria decision analysis (MCDA) is necessary to determine the optimum option because various solutions will meet various goals to varying degrees.
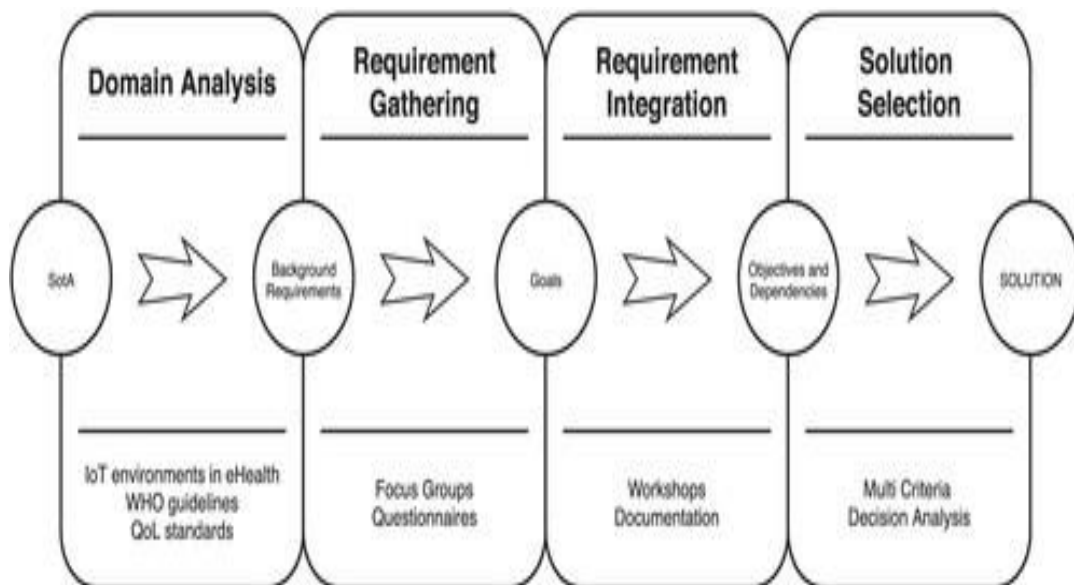
USES :

The real-time position of medical equipment including wheelchairs, defibrillators, nebulizers, oxygen pumps, and other monitoring equipment is tracked using IoT devices tagged with sensors. Real-time analysis may also be done on the placement of medical personnel at various sites.

SMART TRAFFIC

• Computer vision is being used by smart streetlights equipped with cameras, microphones, and sensors to collect information on traffic, accidents, and crime. In an emergency, they can summon assistance and point people in the right direction.

• By assessing traffic conditions, adjusting their timing, and reducing congestion, smart traffic lights are enhancing urban mobility. They may automatically provide first responders the right of way in an emergency.

• By recording and analysing traffic patterns, identifying dangers, and issuing warnings about impending collisions, smart junctions are lowering collisions and injuries.

• Video, audio, and vehicle telemetry are being recorded and shared by smart emergency vehicles, giving dispatchers a real-time perspective of the scene and crucial information for planning and training.

METHODOLOGY

The Internet of Things' smart people bridge the gap between the physical and digital worlds and introduce new features:
Real-time data gathering for operational purposes, decentralised information processing and decision making, and independent execution of all business activities
intervals using digital data processing
Using automated data collecting, high

For both businesses and individuals, these features significantly increase value:
Supporting people in their work by providing innovative cyber-physical services and user-friendly, intuitive devices obtaining more information about operations at more frequent

resolution management supports planning, management, and controlling.

FLOW DIAGRAM:
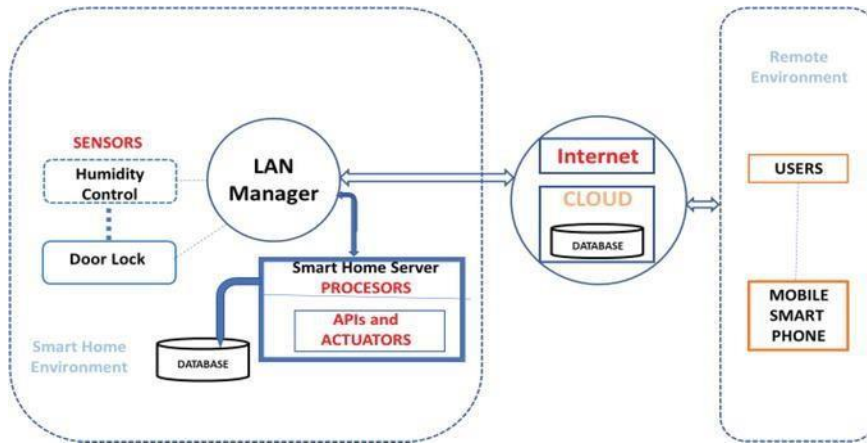
USES: It is one of the most well regarded smart city applications that are now in use. This kind of programme and tools make it simple to track and monitor activity, which promotes improved security and upkeep. It is possible to keep an eye on activity and uncover any antisocial behaviour with the aid of a video camera and CCTV camera.

It aids in preserving the air's quality and volume in the space and other desirable locations. It functions as a remote-controlled sensor room temperature controller. To administer it, all you need is internet access.

When using these kinds of occupancy sensors, one may ensure that resources are used as efficiently as possible.

When the resources are not being used by humans, this kind of occupancy sensor aids in achieving the best possible usage of the resources. As an illustration, when no one is there, light control sensors will cause the fans and lights to switch off automatically.

SMART TRAFFIC MANAGEMENT

One or more twists of insulated wire are inserted into a small cut out in the road for inductive loop detection. A lead-in wire connects the controller and the electronic unit inside the controller cabinet to the roadside pull box. The induction of the wire changes when a car

drives over the loop or pauses. The frequency changes as a result of the change in induction. The electronic device sends a signal to the controller in response to this shift in frequency, indicating the presence of the vehicle. Knowing the

presence, passage, occupancy, and even the number of cars moving through a specific region are all possible thanks to inductive loop detection.

FLOW CHART :
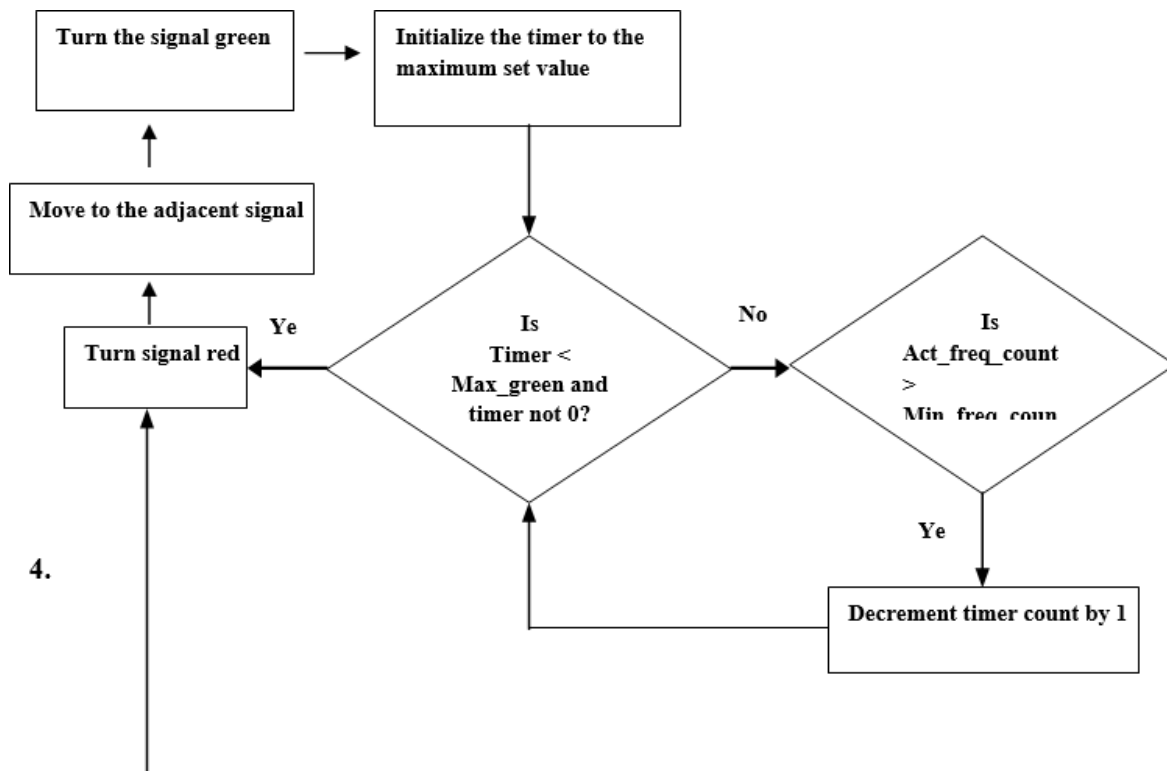
4.

USES :

Monitoring and controlling traffic congestion

There is still another way to detect traffic congestion in addition to the first one. It is possible to keep a server that can receive certain vital data that has been calculated by the signal controller. The major objective is to build a system that would track individual vehicle travel times as they pass roadside controllers and compute an average journey time using a rule-based method to determine whether the area is congested or not. If congestion is detected, the system will manage traffic lights and send messages to specific oncoming vehicles to automatically reroute them**.**

Automatic speed limit detection Violation

This method can be used to determine a driver's speed and determine whether he is driving beyond the posted speed limit. If the driver disobeys the law, they will receive a warning by audio and/or video interface, and the server will calculate the fine and send the vehicle owner a monthly charge.

Core area and toll charges are automatically billed

The same infrastructure is used for automatic toll collection and automatic "core area charge" collections. The controller units will be positioned at toll booths and along the motorable roads surrounding the core area. They will be able to detect each individual vehicle within their zone uniquely by capturing their device ids and will keep track of the time the vehicle was seen by those Controllers within their reading zone. A primary server will get this data. As a result, the primary server will compute the fees and generate invoices for the vehicle ids.

Conclusion and next work

The proposed work focuses on developing a smart traffic control system employing RFID, which will do away with the shortcomings of the current system, including its high implementation costs and reliance on external factors. The proposed approach tries to handle traffic congestion effectively. Additionally, it is more affordable than the current system.

SMART PARKING

Industries all over the world are quickly adopting fully automated technologies.Manual operators are being replaced by control systems, and completely automated machines are taking the place of workers. Smarter machines and fewer workers result in reduced operating and while raising the level of services or goods offered, personnel expenses. By including a smart parking system into this study, parking lots will provide higher-quality services mechanism that helps drivers locate open parking spaces . It includes parking concept for a guidance and information system that will effectively help drivers and guarantee the security of the vehicles and the contents inside. In this parking system, a computer keeps track of users' licence plate numbers and logs their use of the parking lot for.

FLOWCHART :
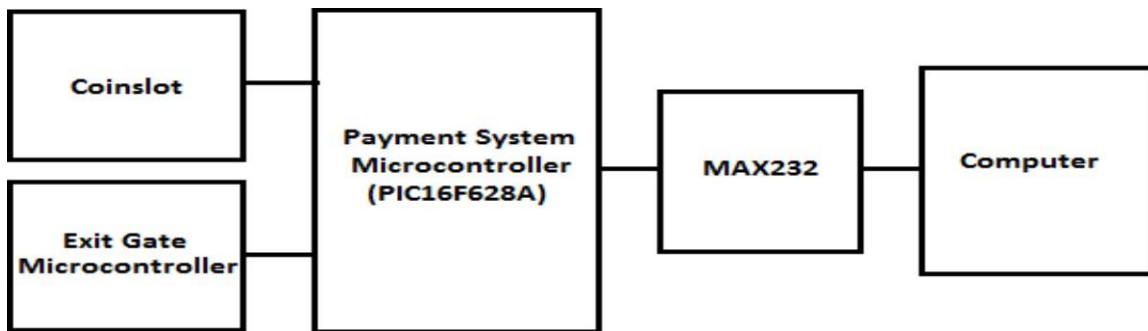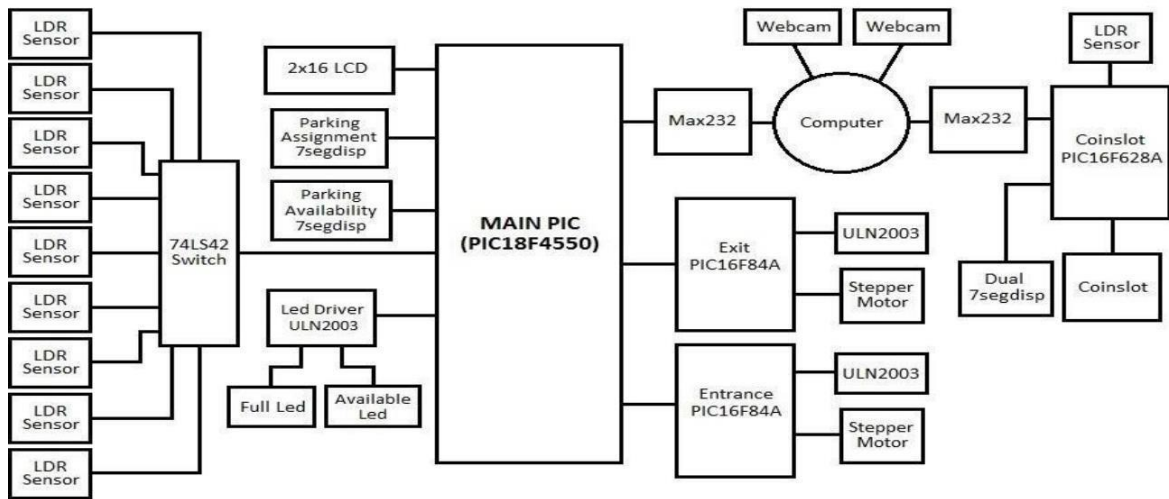
SMART WASTE MANAGEMENT

All waste materials, with the exception of unsure waste, liquid waste, and regional emissions, are included under the umbrella term "solid waste." The two main categories of residential and commercial solid wastes are frequently added to this division. The waste that is referred to as "garbage" is the subject of the residential cluster. The waste that is collected by community services falls under the category of rubbish, which is frequently represented. Industrial and agricultural clients are clients of the business cluster. These buyers generate greater amounts of waste and are much more dispersed. The primary and most significant distinction between urban routes and business routes is that the waste management company serves locations, i.e. businesses, rather than streets or neighborhoods.

FLOW CHART :
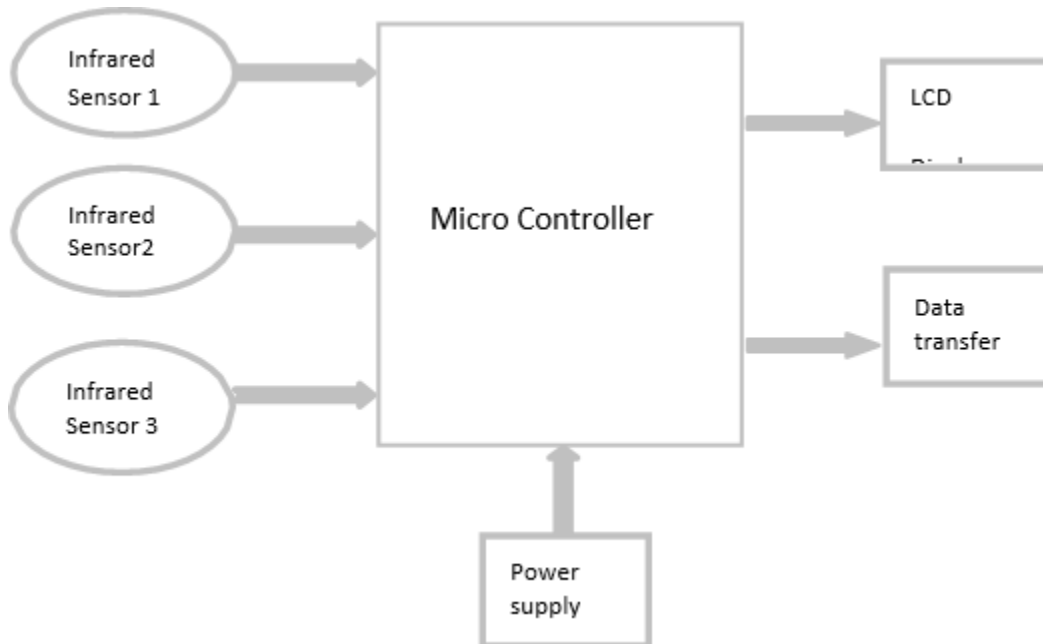
SMART AIR MANAGEMENT

Our daily activities and quality of life are both impacted by air pollution. The ecosystem and the standard of living on the planet are at risk. Since there have been more industrial activities in recent years, there is a very obvious need to monitor the quality of the air. People need to be aware of how much their actions have an impact on the quality of the air. A system for monitoring air pollution is proposed in this project. The Arduino microcontroller was used in the creation of the system. The real-time monitoring and analysis of air quality along with the logging of data to a remote server that receives updates through the internet are all features of the air pollution monitoring system. The Parts per Million (PPM) measures were used to measure the air quality, and Microsoft Excel was used to evaluate the results.

EMERGENGY PREPARATION AND DISASTER MANAGEMENT

The most frequent natural catastrophes, which can happen anywhere in the United States, are caused by meteorological and geological occurrences. Their effects can be small-scale or large-scale, predictable or unforeseen. From minor to significant damage is possible. The infrastructure (roads, bridges, and utilities) of any location may be affected long-term depending on the severity of the incident. The organisation that supports disaster

preparedness and mitigation efforts as well as coordinating response and recovery after a major disaster has been declared is the Federal Emergency Management Agency (FEMA). A disaster, according to FEMA, is "an occurrence that leaves a significant number of people dead or injured; significantly impairs or destroys facilities that meet and sustain human needs.

CONCLUSION :

This paper summarizes about the various technologies integrated in developing smart cities. The present uses of IoT technology in smart cities and the resulting public benefits are covered in depth. In today's hectic environment, IoT in Smart Cities has become a reality, and the line separating fact from fantasy has blurred .

The potential automations in this sector in the future are described. The technology's difficulties and potential applications in the future are examined. The lives of the people would be bettered if smart cities are constructed in an organised manner with good planning and analysis.

EMERGING STRATEGIES FOR DATA AGGREGATION IN UNDERWATER WIRELESS SENSOR NETWORKS

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ABSTRACT

Underwater Wireless Sensor Network (UWSN) technology is extensively employed in several underwater surveillance and exploration activities and has established itself as an advanced technology. For efficient and qualitative research analysis, several UWSN methods have been developed throughout the years or current protocols have been modified. One of the strategies that is frequently utilized in conjunction with UWSN procedures to get better outcomes is data aggregation. Therefore, it is first and foremost essential to deliver a regular assessment of data aggregation. In this study, we emphasize the advantages and disadvantages of the UWSN survey with data aggregation. Researchers have suggested a data aggregation approach in which the aggregator node gathers the detected data from surrounding nodes, processes it, and then transmits it to the sink in order to build energy-efficient algorithms for UWSN. The goal of this work is to stimulate the attention of the research community in issues that mayarise in the future and will be determined by a survey of current solutions. The methods that are now used to aggregate data may be classified as cluster-based, non-cluster-based, and other strategies. The currently used methods are examined together with their benefits and drawbacks. In addition, the energy consumption, latency, and packet loss for K-means, distributed underwater clustering system, and Round-based clustering techniques are examined with and without aggregation.

Keywords – Aggregation, Underwater Sensors, Cluster, Distributed clustering.

INTRODUCTION

Underwater Wireless Sensor Networks (UWSNs) are a relatively new topic of research, however there has previously been extensive research done on terrestrial sensor networks in many areas [1]. UWSN is different from commonly used land-based sensor networks in terms of the way acoustic signals are sent, the price of expensive sensors, the amount of memory available to

store data, the amount of power available for communication, and the density of sensor deployment. UWSN is used in many applications having underwater environment like pollution monitoring especially chemical waste, monitoring of the population of underwater flora, fauna, the examining of the health of rare marine creatures, mine reconnaissance, disaster prevention, assisted navigation, nutrient production, oil leakage detection, distributed tactical surveillance, oceanographic data collection, target detection, tracking and underwater military applications [2].

In UWSN, sensor nodes are set up in a network to gather data or information and send it to a sink. The UWSN protocols are being used for monitoring purposes in various aquatic mediums, such as rivers, lakes, ponds, etc. However, as oceans and other big bodies of water have a larger surface area and a variety of variables that must be evaluated in real time, such as the area that will be affected, the water's level, the pressure, etc., these processes might not provide accurate information in these cases [3]. The approach of data aggregation is being utilized in addition to routing protocols to get around this problem, where greater data is gathered and aggregated at a node before being transmitted to a sink.

An underwater network is often made up of numerous separate sensor nodes that combine data and use forward operations to transfer the combined data to a node referred to as the sink node. Operating costs, memory requirements, communication range, and the finite lifespan of individual sensors present the greatest organizational challenges [4].
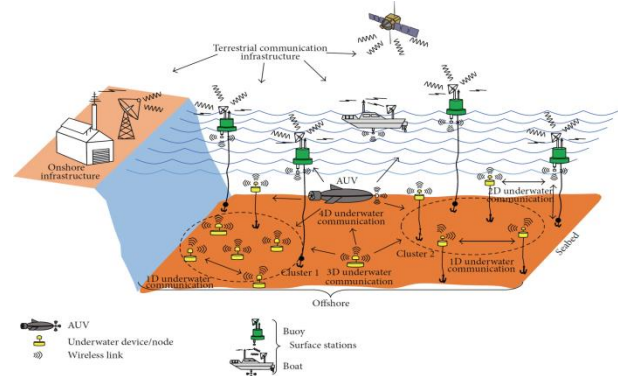
Figure 1. Underwater Wireless Sensor Network Scenario
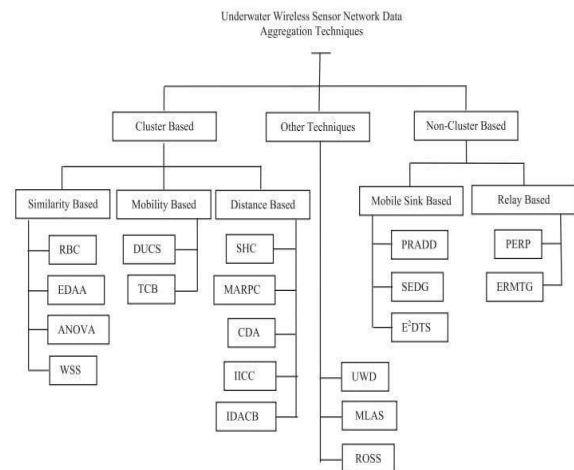
Figure 2. Classification of UWSN data aggregation techniques

EXISTING SURVEY ON DATA AGGREGATION IN UWSN

Typically, more network models have been employed for the distribution of nodes by routing schemes and methodologies regarding different algorithms, but still, the design of energy-efficient routing protocols is one of the key challenges in the development of the underwater environment. Besides, clustering, aggregation, and Quality of Service (QoS) are important models to reduce energy consumption and transmission loss [7]. Aiming at these concerns, this paper presents an Energy-aware QoS based cluster routing with an aggregation management

algorithm (EQoSCRAM) to provide efficient path discovery with less energy consumption for UWSN. Data aggregation is performed using sleep wake scheduling process from the cluster area to avoid collisions. EQoS-CRAM approach offers priority-based QoS data transmission with less delay.

In underwater wireless sensor networks (UWSNs), most of the mobile sink data gathering scheme assumes that sensor nodes are static [8]. Also, very limited set of works aim to eliminate the data redundancy during data gathering. Moreover, the data collection latency, error rate and load have to be considered in addition to the buffer space and energy level of the nodes. Here, a mobile sink data gathering technique is designed where rendezvous points (RPs) and sojourn times are selected. The RPs, where the mobile sinks stop to gather the data, are selected based on the node density, current traffic load and energy level of nodes. The proposed scheme, that is, adaptive distributed mobile sink data gathering (ADMSDG), eliminates data redundancy even by considering mobility of all the nodes including sink node.

A novel scheme, Floating Nodes assisted Cluster-Based Routing (FNCBR) scheme for efficient data collection in UASNs was proposed. In FNCBR [12], the network space is divided into cuboids to form clusters. Then, every cuboid is consigned with a floating node (FN) at the surface layer and two fixed cluster heads (CHs) are suspended at different depth levels. All CHs of cuboids are supposed to be connected with a floating node via a wired connection, while source nodes are haphazardly distributed in the whole network region. In FNCBR, source nodes are liable to send the sensed data either to the FN or to the nearest CH. The data collected by the CHs is moved towards the FNs, which further disseminate the data to the on-shore monitoring center via a Radio Frequency (RF) link.

Autonomous Underwater Vehicles (AUVs) are a considerably reliable source of data collection if they have significant trajectory movement. Therefore, in this paper, a new routing algorithm known as Elliptical Shaped Efficient Data Gathering (ESEDG) is introduced for the AUV movement [14]. ESEDG is divided into two phases: first, an elliptical trajectory has been designed for the horizontal movement of the AUV. In the second phase, the AUV gathers data from Gateway Nodes (GNs) which are associated with Member Nodes (MNs). For their association, an end-to-end delay model is also presented in ESEDG. The hierarchy of data collection is as follows: MNs send data to GNs, the AUV receives data from GNs, and forwards it to the sink node.

CLASSIFICATION AND STATE-OF-ART

A cluster-based method for the UWSN that involves CH election and cluster creation. Additional data is sent to the sink node both with and without the use of data aggregation (averaging technique).

Harb et al. designed a k-means algorithm - a heuristic algorithm that attempts to do k-means clustering. An ideal k-means clustering algorithm selects k points such that the sum of the mean squared distances of each member of the set to the nearest of the k points is minimized.

Domingo et al. presented DUCS

(Distributed Underwater Clustering Scheme), where random mobility of nodes is assumed and timing was adjusted continually to reduce loss of data. It uses GPS-free routing protocol without using any flooding technique. It minimizes the proactive routing message exchange

Tran et al. designed a technique named as round-based clustering (RBC). It performs in rounds which constitute four phases that are initialization, cluster-head selection, clustering and data aggregation phase.

PERFORMANCE ANALYSIS OF AGGREGATION TECHNIQUES

The cluster-based method divides the network into clusters, which are collections of nodes, and specifies a technique for linking each cluster to the others. A focused and reliable network is produced by the cluster-based configuration. Additionally, reducing network energy usage is a difficult topic that has recently received attention in UWSN.

K-Means and an ANOVA model were used. A clustering method based on similar node reading function has been reported by Herb et al. (2015). They hypothesized that readings serve as the data transmission medium between nodes and the cluster head (CH). Two stages of data aggregation are present in the scheme. First, before delivering its data set to its CH, each node periodically cleans its reading to minimized data duplication. Following data transmission, the K-means method, which is based on a one-way ANOVA model, is used to alert nodes that produce similar sets of data, aggregating the similar sets before transmitting them to a sink. In general the readings are sent periodically from sensor

nodes to their appropriate CHs. They also used distributed energy-efficient clustering algorithm for efficient communication between cluster head and base station.

SIMULATION PARAMETERS

Parameter	Values
Network size	75 nodes
Simulation time	10, 20, 30, 40, 50 s
Packet size	250 bytes
Delta value	0.5
Traffic rate	50 Kbps
Channel capacity	2 Mbps
Range	100 m
Initial energy	1000 J
Transmission power	2.0 W
Receiving power	0.75 W

The figure shows the average delay occurred in K-means clustering technique with and without aggregation. It is inferred from the results that K-means clustering technique when applied without aggregation in UWSN involves more collision amongst the data packets as compared to the technique applied with aggregation.
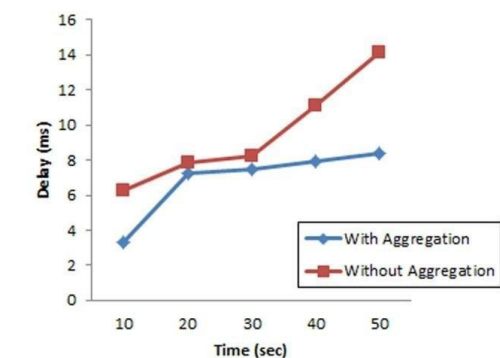
Average data delivery delay vs time for K-means clustering.
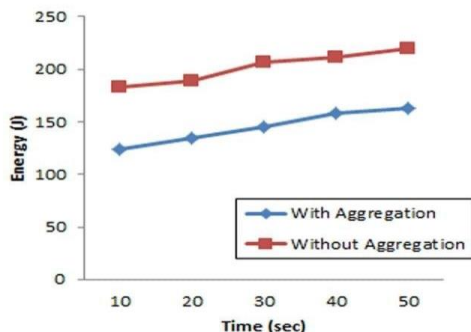
Average energy consumption vs time for K-means clustering.
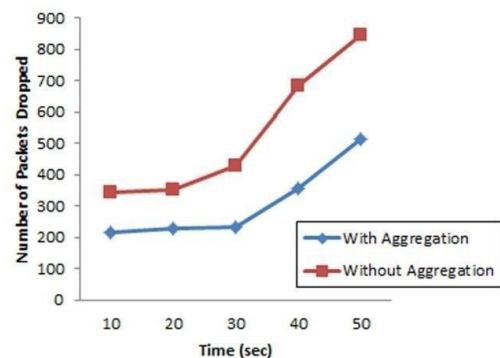
Average packets dropped vs time for K-means clustering.

Figure 3. Performance evaluation of K-means clustering

Thus at particular intervals of time there occurs 27% less delay in case of with aggregation in comparison to thetechnique without aggregation.The technique of data aggregation consumes lesser energy thus the K-means clustering technique with aggregation consumes 28% lesser energy in comparison to without data aggregation scenario. The reason behind the same is the occurrence of huge redundancy while sending data without aggregation.

The analysis represents the average packet drop occurred w.r.t. time measured in seconds for K-means clustering technique with and without aggregation. Packet drop after aggregation is 41% less as compared to without aggregation. This is due to the fact that the technique of aggregation when applied leads to lesser number of collisions. However absence of aggregation implies more collision and buffer overflow in the network.

Distributed underwater clustering system (DUCS) have presented DUCS (Distributed Underwater Clustering Scheme), which assumes random node mobility and continuously modifies time to minimize data loss. Without utilizing any flooding techniques, it uses a GPS-free routing mechanism. The proactive routing message exchange is reduced to a minimum. To reduce data duplication, more data aggregation is used. Using a constantly modified timing advance along with guard time values, the technique further improves communication while reducing high propagation delay in the aquatic medium.

The analysis reiterates that the presence of aggregation leads to collision free network and lesser packet drop w.r.t. time. The numbers in the graph implies that average number of the packet drop is 73% lesser in the scenario of DUCS clustering technique with aggregation than without aggregation scenario. Also it has been seen that there is buffer overflow in the network in case of without aggregation.

Average packets dropped vs time for distributed underwater clustering.
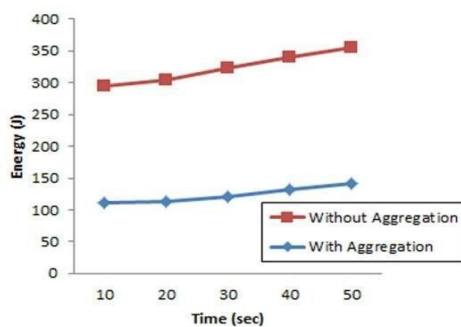
Average energy consumption vs time for distributed underwater clustering.

Average data delivery delay vs time for distributed underwater clustering.

Figure 4. Performance evaluation of DUCS clustering

The figure infers that the average energy consumption for DUCS clustering technique with aggregation is 38% less in comparison to the technique without data aggregation. The occurrence of huge redundancy during data transmission in case of without aggregation consumes more energy.The figure shows that delay for DUCS clustering technique is 31% less in presence of data aggregation as it involves lesser collision amongst data packets in the network.

Round-based clustering is a technique developed by Round-based Clustering (RBC). The four processes of initialization, cluster-head selection, clustering, and data aggregation are performed in rounds. The network's sensor nodes and sink node are deployed during the initialization phase. In this case, the sink node starts a round by setting the time. The selection of cluster-heads takes place in the second phase. Gathering data on residual energy, location, and proximity to the BS/sink node occurs during this phase. Clusters are created for each cluster-head and its members during the clustering process. Data is then gathered and sent to the sink node by cluster-heads in the final step. This process of clustering prolongs the network lifetime. This technique saves energy consumption thereby enhancing throughput of the network.

The figure reiterates that the presence of aggregation leads to collision free network and lesser packet drop w.r.t. time. The numbers in the graph implies that average number of the packet drop is 42% lesser in the scenario of round based clustering technique with aggregation than without aggregation scenario. Also it has been seen that there is buffer overflow in the network in case of without aggregation.
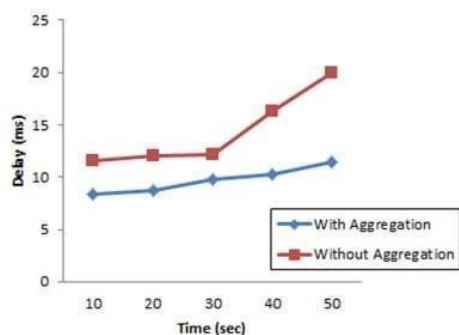
Average data delivery delay vs time for round based clustering.

Average energy consumption vs time for round based clustering.
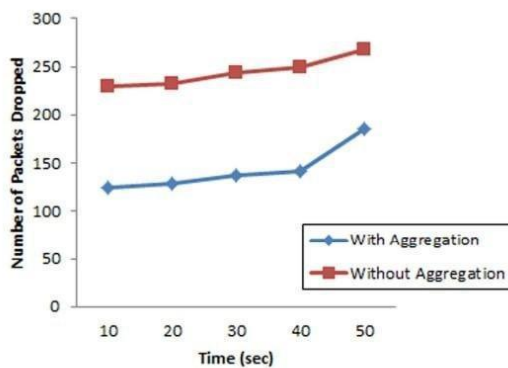
Average packets dropped vs time for round based clustering.

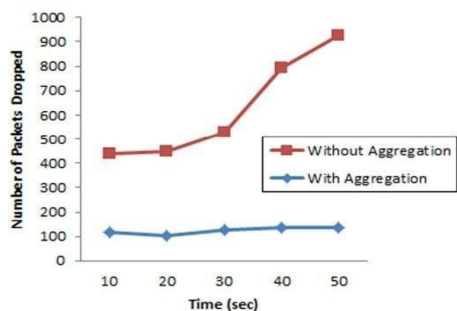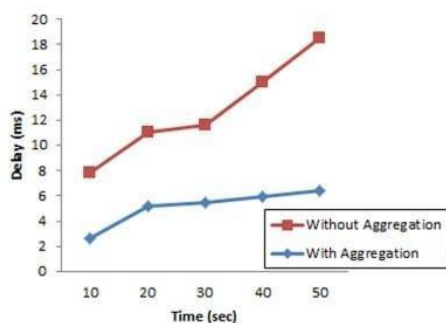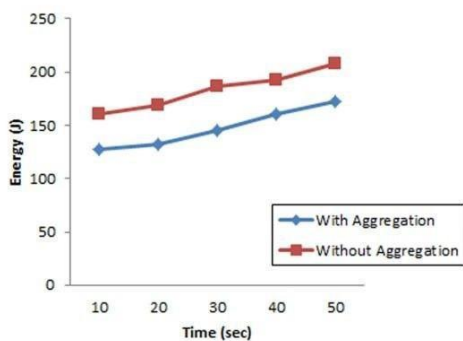Figure 5. Performance evaluation of RBC clustering

The figure infers that the average energy consumption for round based clustering technique with aggregation is 20% less in comparison to the technique without data aggregation. The occurrence of huge redundancy during data transmission in case of without aggregation consumes more energy.

OPEN ISSUES AND FUTURE CHALLENGES

The future challenges of data aggregation techniques in UWSN are listed below:

i. The clustering protocol should be energy efficient and reliable.

ii. The cluster heads involved in data aggregation process should be honest and trust worthy.

iii. The aggregation should ensure fault tolerance (i e.) it should handle all types of faults involved in the data delivery.

iv. The aggregation should be free from collision or interference by choosing suitable scheduling technique.

v. The aggregation should be free from congestion and overloading.

vi. The aggregation technique should provide suitable loss recovery techniques for recovering burst losses.

vii. The similarity functions used for data aggregation should eliminate the outliers or inconsistent data.

viii. Node or cluster head mobility should be handled in an efficient manner.

ix. The aggregation techniques should ensure minimum latency and overhead.

x. While constructing aggregation trees or paths, effective void recovery and depth adjustment processes should be applied.

CONCLUSION

The data aggregation methods in UWSN that have been discovered by researchers in

the past are surveyed in this study. For the purposes of surveillance, monitoring, assisted navigation, etc. in UWSN, a number of protocols have been developed. Further research revealed that employing data aggregation will reduce energy usage during data transmission as well as lengthen the network's useful life. Based on research, the data aggregation techniques are classified into three major categories that are cluster based, non-cluster based, and other techniques. For the very purpose, we have considered three cluster based techniques that are K-means, RBC, and DUCS clustering, whose results are graphically represented in terms of delay, packet drop and energy consumption using MATLAB.In our paper, the simulation results of a technique with data aggregation is compared to the results of same technique without data aggregation to show the impact of data aggregation.The reduction in the three parameters delay, packet drop and energy consumption in case of protocol with data aggregation is mainly due to lesser collision and redundancy.This has truly justified the use of data aggregation technique along with routing protocol in UWSN as an efficient tool and has generated the need of survey on data aggregation that may create further interest towards its scope and to overcome its limitations to meet the identified challenges.

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ENHANCING SECURITY USING HONEYPOTS.

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Abstract—The term "honey pot" refers to a non-productive device used to lure attackers with alluring bait. Using black hat approaches can help system administrators become more aware of system problems. This report offers a summary of current developments in honeypot research based on an assessment of more than 20 papers on honeypots and related topics. In contrast to conventional IDSs, honeypot technology is a recent advancement in the field of intrusion detection that tends to give the attacker all the tools they need to launch a successful attack. The usefulness of honey pots comes from the nefarious use of their assets, providing a platform for investigating the methods and tools used by intruders.

Keywords: Intrusion and Detection, Honeypots, and Nefarious.

I.INTRODUCTION

Protecting computers from attacks launched by malicious users is the fundamental purpose of computer security. Researchers and developers may attempt to safeguard the software they create in a variety of ways. Some are reactive, such as owning your competitors, where new vulnerabilities are leveraged to target browsers, while others are proactive, such as code reviews and regression testing. Honeypots are one type of tool that can combine both functions. During the Cold War, ensnaring an opponent in a trap to obtain intelligence was referred to as using a honey pot or honey trap. A "honey pot" is a trap that is set up to detect, foil, or otherwise dissuade attempts to exploit information systems without authorization.

II.HONEYPOTS

A special security tool used as part of a security system in an organization is called a "honey pot." You want the bad guys to use these tools, after all. Because a honey pot is essentially an IT resource whose value is derived from illegal or unlawful use, the value of honey pots

may be generated from the risks associated with their use. They are only partially useful if an attacker doesn't interact with the honeypots. Some problems cannot be solved with honey pots. They are tools with security-related applications. They can serve as early warning systems, halting automated attacks and snatching up fresh exploits to gather information on new dangers. Furthermore, honey pots come in a range of sizes and designs.
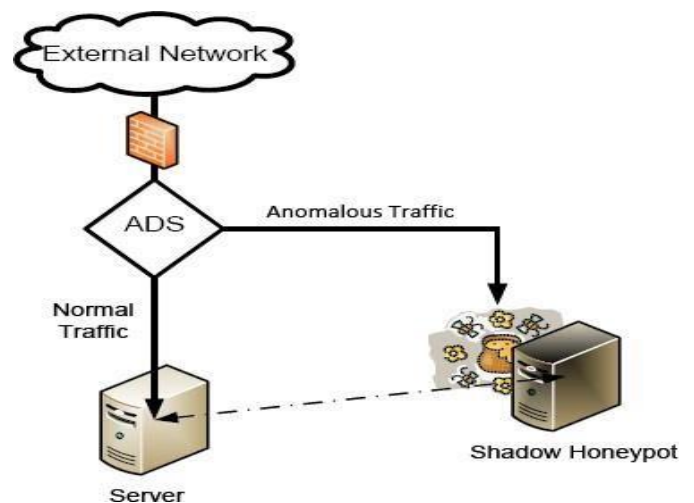
Figure 1:Architecture of honeypots.

III.INTERACTIONS OF HONEY POTS

III.1. Low Interaction Honey pots
According to low-interaction honeypots, the intruder is not given access to the operating system. It just offers services like FTP, HTTP, Sash, etc. These low-interaction honeypots serve as passive IDS devices, allowing network traffic to flow unaltered. Honeyed, specter, and BOF are a few instances of honey pots with limited interaction. In contrast to spectre, which was developed by Netsec and is not an open-source programme, honey is an open-source tool with limitless service emulation capabilities. The well-known illustration of a honey pot with little interaction is honey. On a single machine, the honeyed ISADaemon replicates a huge network. It offers a structure for generating

several virtual hosts using free IP addresses on the
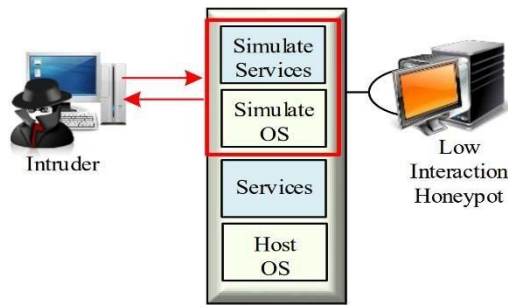
Figure 2:*Architecture of low interaction honeypots.*

network.

III.2.   Medium Interaction Honey pots

These are similar to low-interaction honey pots in that they don't grant OS access to attackers but are morelikely to be probed. Nepenthes, Diocese, honey traps andcollect are a few examples of medium interaction honey pots. These honey pots also offer the attackers fugitive services. You can use Mwcollect and nepenthes to gather the propagating malware.

III.3. High Interaction Honey pots

These are the most advanced honey pots. These create challenging design and implementation issues. These honey pots require a lot of time to build and pose the greatest hazards due to the fact that they employ real operating systems. Nothing is mimicked or restrained in high-interaction honeypots. Sebeka and Argos are two examples of honeypots with high engagement. These honeypots involve real operating systems, which considerably enhance the level of danger. As a result, a kind of trade-off is made to gather a lot of information by permitting an attacker to communicate with the real operating system. This aids in recording the behavior of attackers so that it may be examined later.
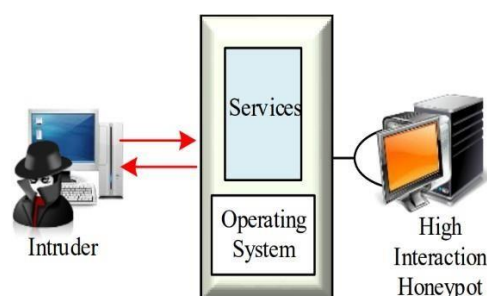
Figure 3:*Architecture of high interaction honeypots.*

IV. HONEY POT FUNCTIONS

Implementing a honey pot essentially has two goals. To appear credible to attackers is the first strategy. The honey pot ought to appear to be worth something. Furthermore, it shouldn't be simple to find it. The Honeypot information collection is the other goal. The honey pot is essentially useless without this. According to the toothier implementation, honeypots can be split into physical honeypots and virtual honeypots. Niles Provosts' Honeyed [Pro04]. Virtual honey pots and virtual networks of honey pots are built using the Honeyed software platform.

IV.1. Physical Honey pots

Tangible honeypots a true computer running the entire software stack constitutes a physical honeypot. The computers have unique network addresses and are connected to a network. Since practically everything is real and there are no unique limits in the environment, a physical honeypot is probably the most convincing honeypot. This allows for almost as much interaction as a real manufacturing system. In order to prevent the honeypot from being exploited to launch more attacks, outbound network connections are typically banned and carefully monitored. Physical honey pots require a lot of upkeep and are quite expensive [Spi02]. First, a certain physical machine is needed for the honey pot. Networking hardware is also necessary for a full networkof physical honeypots. Monitoring and analysis are also relatively challenging.

IV.2. Virtual Honey pots

The honey pot system is simulated using software in a virtual honey pot. In comparison to an actual honey pot, this has several benefits. It is simpler and safer to operate a virtual honeypot because only the necessary functionality needs to be provided. [BKH06]. Furthermore, simulation enables the implementation of even complex honeypot networks with relatively low resources [Pro04]. A physical honey pot always has a high level of engagement since it uses a real operating system. In terms of engagement, virtual honey pots offer more variety. A very basic honey pot with little interaction might only have a phony service. A virtual network stack might be implemented and numerous services could be launched simultaneously in a morecomplex honeypot. To create a honeypot with high interaction, a real operating system and a virtualmachine could be employed.

V. HONEYED

A framework for building digital honey pots is called Honeyed. It can imitate different TCP and UDP services and works at the network level. Therefore, Honeyed is a honeypot with little involvement. The framework can simulate both individual network hosts and large networks. A packet dispatcher, protocol handlers, a personality engine, and a routing component make up Honeyed's major parts. The other components' operational details are specified in a configuration database. It contains a number of templates that describe the topology of a virtual network. A template is a honeypot's specification. To develop virtual honey pots, templates are tied to network addresses.

VI. HONEY POT COMMUNICATION WITHIDS/IPS

IDS and IPS systems in a network can complement each other with honeypot systems as security measures. Recent research in the literature demonstrates that honeypot systems are utilized in conjunction with intrusion detection systems. Figure 4 depicts the general configuration of the scenario when honeypot systemsand IDSs are utilized in tandem. Figure 4 illustrates how honeypot systems can be used in this kind of hybrid approach as a zero-day detection engine. As a result, new assaults that were previously undiscovered can be found. Considering that the majority of traffic on the honeypot is malicious.

The vulnerability of honeypots gives them strength. A hive's attention by exploiting its security flaw, simulating the security vulnerability reaction, or both. Bees are used to producing honey and serve as a trap. Provide them with intruders to assault. Since they lack genuine and important information about them. They arenot a real-world threat Unlike other networks and information sources, equipment for security, such as intrusion detection systems Firewalls, and honeypots are not used to solve particular issues. solution. A smallcomponent of security systems is honeypots. Each problem solution is directly correlated to its usage, design, and how they are used.

The primary uses for honeypots in conjunction with IDS/IPS systems are as follows:

- To be better knowledgeable about intruder tactics and security flaws.
- To detect intruders and other unwanted traffic.
- To identify attacks from outside the network as well as malicious activity that already exists on the network.

- To conceal the actual systems, which are built via honeypots.
- To identify fresh attack strategies and patterns.
- To increase system security.
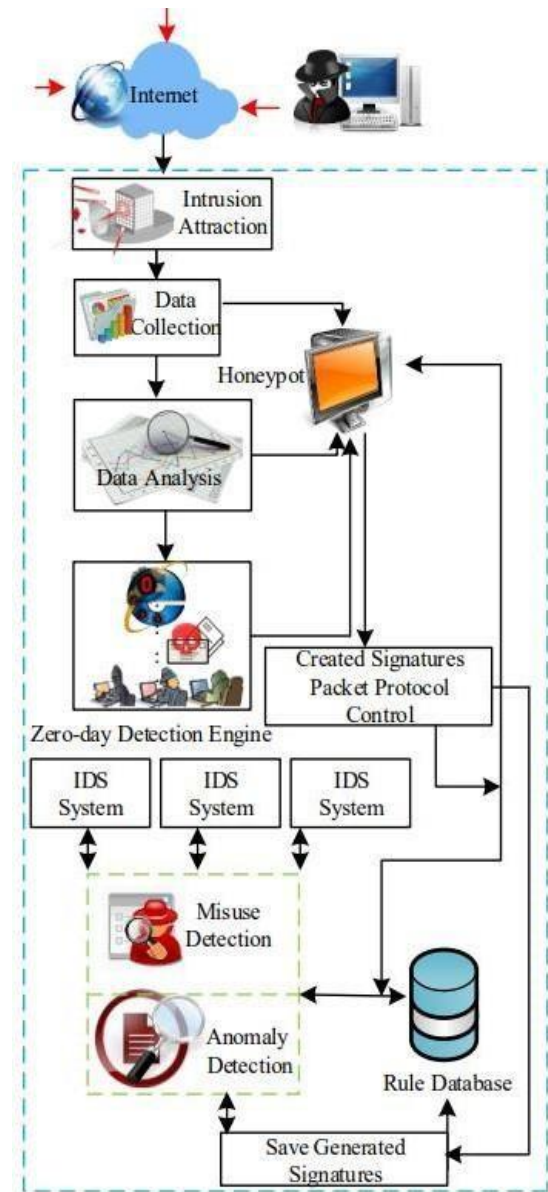
Figure 4:Honey pot communication with IDS/IPS

VII. NETWORK DECOYS

Network monitoring can benefit from the use of honey pots [Pro04]. In those areas of a network that are not used for production, honey pots are set up for monitoring. There should ultimately be some traffic that reaches one of the honey pots when an attacker probes the network. Usually, warnings are reliable before reaching honey pots. However, if the attacker is aware ofthe honeypots, they are ineffective. Additionally, theyare unable to recognize the absence of attacks. By developing decoy systems, honey pots can be used for purposes other than network surveillance [Pro04]. The

attacker might be unable to distinguish between systems that are truly valuable and those that are not. As a result, the attacker might have to put in more effort and spend more time attacking the system. This facilitates simpler detection.

VIII. PREVENTION OF SPAM

Spammers conceal their identity by using open mail relays and open proxies [Pro04]. Any sender is accepted by an open mail relay without the need for authentication. Any client on the network is permitted to establish connections through open proxies. To catch spam and identify its sources, use honey pots that pose as open mail relays or open proxies. Spam that has been caught allows for better filtering. Knowing where the spam is coming from may make it possible to block the spammer from the network. Instead, a honeypot can be used to gather the source addresses of attempted mail deliveries. The addresses are momentarily added to the blacklist of the actual mail server. This eliminates information from sources that will virtually surely try to spread spam. So far, honeypots appear to have had some success.

IX. COLLECTING MALWARE

Malware samples that spread on their own can be automatically collected by an appropriate honey pot. This enables the widespread capture of live malware. This enables, for example, research on real-time data and continuous improvement of antivirus and intrusion detection programs [BKH06]. Malware capture by hand would be far too slow. This filters out sources that almost certainly attempt to distribute spam. So far, honeypots seem to have had some success. The Nepenthes platform, a low-interaction honeypot, does this in the manner described below [BKH06]. The platform simulates a number of well-known, remotely exploitable vulnerabilities. The payload of a network connection that could result in an exploit is captured by the honey pot. The presence of machine-executable code in the payloadis then determined.

X. DETECTION OF MALICIOUS WEB CONTENT

Web browser flaws could make it possible for malicious Web pages to infect the system with malware. Nowadays, exploited pages are rather common, making manual identification and analysis impractical [WBJ06]. Client honeypots can aid in the analysis and at leastpartially automate detection. Exploits are discovered

using Honey Monkey, a high-interaction client honeypot [WBJ06]. A variety of virtual machines running Windows XP instances at different levels of patching make up the system. A list of URLs is sent to the system,and each one is visited by a customized Web browser running inside a virtual computer. The system, files, and registry are inspected in between URL visits. The URL would be reported as if any alterations were made outside of the working area of the browser.

XI. LEGAL ISSUES PERTAINING TOHONEYPOT

The majority of the research on this subject came to the conclusion that there are two main legal spectrums when it comes to honey pots:

1. *ENTRAPMENT:*
   When a criminal is coerced into acting against his better judgment, this is called entrapment. In general, honey pots should be utilized as a protective detective tool rather than an aggressive attempt to lure intruders.

2. *PRIVACY:*

   The tracking of operational and transactional data is the second significant area of privacy concern. Transactional data contains things like keystrokes, websites visited, files downloaded, chat logs, emails, and other things, whereas operational data includes things like user addresses, header information, and other things.

XII. CONCLUSION

Business enterprises are poised to use honey pots as a crucial defense against hacker attacks. It's a method of surveilling your adversary, and it might even serve as camouflage. When hackers are actually just hanging around in a honeypot, keeping the real network protected, they can fool people into thinking they have accessed a business network. Honeypots have become a crucial part of the enterprise's overall intrusion security approach. Security professionals advise against replacing current intrusion detection security methods with these systems; instead, they see honeypots as a supplement to host- and network-based intrusion detection. It's difficult to deny the benefits honeypots offer in incursion protection techniques. As security managers learn over time.

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HEALTH MONITORING SYSTEM IN PUBLIC PLACES

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Abstract - By using a health monitoring system, we can find our health details. The health details are like height, Weight, Body Mass Index (BMI), Oxygen level of a blood, pulse rate and body temperature. Those health details are displayed, stored and shared to the user for their medical reference in the future moment. This function is done by GSM based

INTRODUCTION

In this project we are using a **pulse oximeter**. A pulse oximeter is a medical instrument that measures the saturation oxygen level of a blood and pulse rate. The saturation point oxygen level is very important to monitor while a patient is at risk for further process of medication. The method of measuring heart rate and oxygen level conventionally is laborious, prone to errors, and requires the presence of a physician. And by using an **LM35 sensor** to check the body temperature. In this project, we use Arduino based smart pulse oximeters to measure oxygen level and heart rate, the values would be sent to our mobile number. By using a remote patient monitoring system, the data transmission is based on the **GSM module**. In this project we use an application to store the data, where it can be viewed through mobile phones.

Health is always a major concern in every growth the human race is advancing in terms of technology. Like the recent coronavirus attack that has ruined the economy of China to an extent is an example how health care has become of major importance. In such areas where the epidemic is spread, it is always a better idea to monitor these patients using remote health monitoring technology. So, the GSM based health monitoring system is the current solution for it. In this idea we proposed a method to protect and help the people using the health monitoring system. So, GSM based health monitoring is well suited for this type of operation.

OBJECTIVE

The objective of developing monitoring systems is to reduce health care costs by reducing physician office visits and hospitalizations procedure (checking for BPM, SPO2 and BMI). The GSM technology is helps to send the patient body health parameter data to our appropriate mobile number.

EXISTING SYSTEM

Actually, nowadays many of the medical equipments and products are available but these are very costly and also, it's not efficient one and normal people can't buy these kinds of products so they go to hospital for check our health in this process also take more time and money

PROPOSED SYSTEM

But our proposed system is used for common peoples and above-mentioned devices are integrated and give it in one single device and it's placed in public places. So, peoples also check our health parameter easily and then they also save our time and money also.

PROPOSED ARCHITECTURE CONCEPT
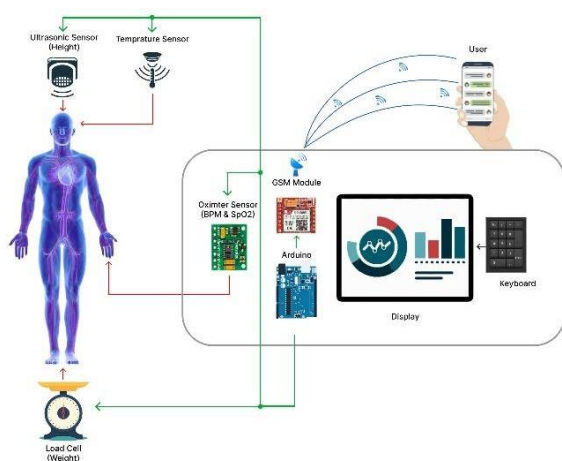
Fig.1. Architecture of Health Monitoring System

BASED ON GSM MODULE

This architecture shows the health monitoring system. They are four sensors for sensing the height, weight of the body, Blood Pressure Measurement, Oxygen Saturation and body temperature. After sensing the health data that will be displayed and shared to the user for the reference. GSM module is used to share the data to the user.

SPECIFICATIONS

A. ULTRASONIC SENSOR

Fig.2.Ultrasonic

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound

into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound.

In this project the ultrasonic sensor is used to measure the height of the human body. The height data is used to calculate the BMI (Body Mass Index).

B. LOAD CELL
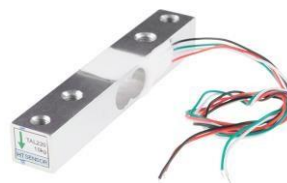
Fig.3.Load cell

Load cells are sensors that detect force (mass, torque, etc.). When force is applied to a load cell, it converts the force into an electrical signal. Load cells are also known as load transducers, because they convert a load (force) into electrical signals. In this project the load cell is used to calculate the weight of our body. The weight data is used to calculate the BMI (Body Mass Index).

C. PULSE OXIMETER

Fig.4.Pulse Oximeter

A pulse oximeter is a device that is usually placed on a fingertip. It uses light beams to estimate the oxygen saturation of the blood and the pulse rate. Oxygen saturation gives information about the amount of oxygen carried in the blood.

In this project the pulse oximeter is used to find the oxygen saturation of the blood and the pulse rate of the body.

D. MLX90614 INFRARED TEMPERATURE SENSOR

Fig.5 MLX90614 INFRARED TEMPERATURE SENSOR

Infrared (IR) temperature sensors enable accurate non-contact temperature measurement in medical applications. The most common applications for this type of temperature sensor is measuring ear temperature, forehead temperature, or skin temperature. But in this project, we are using skin temperature sensor. For measuring the body temperature.

E. ARDUINO UNO

Fig.6.Arduino UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

In this project the Arduino uno helps to calculate the health data and process the data for display and sending the data.

F. 16x2 LCD DISPLAY

Fig.7.16x2 Lcd Display

LCD Display It is a very basic module and it can display 16 characters per line. It is used to display the values from the Temperature sensor, Pulse sensor, BMI, Height and Weight.

G. GSM MODULE

Fig.8.GSM Module

A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks. They use SIMs to identify their device to the network.

In this project the GSM module is used to send the health data to the user. When the user enters their mobile number, they can receive their health details in SMS. The SMS is automatically stored in their phone. And it helps to feature reference.

CONCLUSION

The Arduino based health monitoring approach using GSM Module that can measure various vital signs such as temperature of body and pulse rate is. Users also can get output in the form of notification through the LCD and can also get a message through the GSM. The main agenda of establishing this model is to alert the patient about the current health condition of the patient via mobile phone. This system reduces emergency situations and it reduces the time and cost also.

This module is applicable for Hospital, home and ambulance and also in public places

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INTEGRATED PLATFORM FOR ENHANCED LEARNING

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ABSTRACT

Nowadays, it is difficult for students to reach their alumni and get the necessary information about their projects. With the technology and tools involved in their alumni project, students do not obtain the necessary information.

To establish a platform for students and alumni. On this platform, alumni provide the necessary information about their project. Students can get information about the project through this platform. In addition, a channel of communication between students and alumni should be established to clear up any confusion.

A website is created and the information about the project is uploaded to it. The information consists of the technology involved and tools used in the project. And alumni contact is also made. In addition to that, students are provided with similar projects that exist. And this platform also provides the learning content for students to learn about the technology involved in the project. A QR code is generated for each project, andthe URL of the project is linked with the respective QR code. The QR code is pasted on the projects showcased inside the campus. Students can scan the QR code to get detailed information about the project and the technology involved. Alumni can also use the website URL to showcase their projects.

For example: when we want to develop a full stack development project for online shopping. We need to collect more information about that in variousplatforms. This would take a lot of time to gather information. By using our web page, we will display the information that are related to their project. By this way the user time is reduced and user gets more exposure to relevant projects to reduce the time consumption on the project content gathering.

Literature Survey

Previous

The projects which are displayed in the college are just like a gimmick thing and student do not have any knowledge about it.

After

After implementation of our project students can get knowledge of the project and also the similar projects to it . They can also clarify the doubts with the persons who created the projects.

Problem Identification

Nowadays, it is difficult for students to reach the developers (Alumni) and get the necessary information about their projects. Developers don't get any investors to invest in their projects.

Proposed System

Students scan the QR and get the information. QR code leads students to the web page containing the information. Webpage shows the information with the mutual web page results.

Use Case:
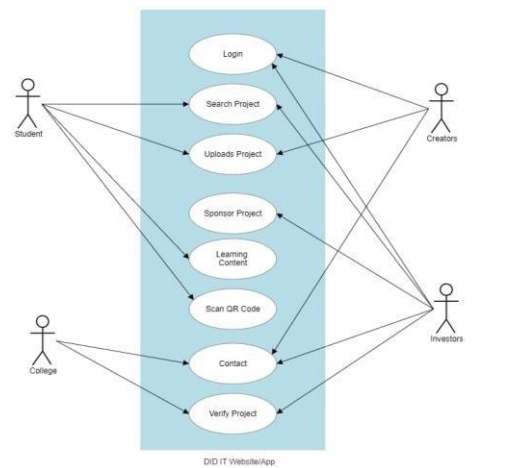
Architecture
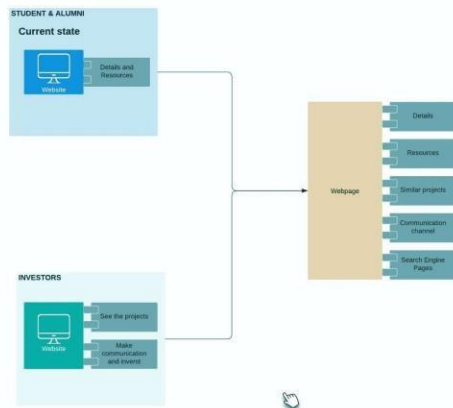
Methodology:

[Creating a QR code scanner app for scanning the QR code]

Generate the QR code for the particular project.

Creating an online page for displaying the details of the projects and similar project related to that topic.

Creating suggested videos and more info related to that topic.

Creating communication between the user and the alumni.

Answering the common doubts related to that project.

Assigning the web page for that particular QR code.

Finally, people scan and get the details of the project

Modules

- Web Development
- URL Matrix Barcode (QR Codes)
- Default Scanner (Google Lens)
- Gmail API
- Search Engine Results pages

Web Development

By Scanning the QR code the web page containing project information is displayed. Information is first stored in the database and retrieved when needed.

Matrix Bar Code

The QR code contains the URL of the respective projects webpage.

QR Code Scanner

Students can use the google lens for scanning the URL to get into the webpage.

Gmail API

Gmail API is a RESTFUL API that can be used to access Gmail mailboxes and send mail. For most web applications the Gmail API is the best choice.

Search Engine Results

Web search results related to the domains displayed in the website. The page that a search engine returns after a user submits a search query.

Future Enhancement

App will be created to expand the networks of the problem. Communication system will be advanced. People can create an account, post their projects, and get socialized with the community.

CONCLUSION

By Scanning the QR code the user will get the more information about the project. In this way the time which spending on searching the project papers is reduced and user gets more exposure to relevant projects.

INTELLIGENT HEALTH KIT SYSTEM

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ABSTRACT - The paper aims to monitor the real time health status of a patient by using Smartwatch based IOT. It senses the health status by sensors in smartwatch and sends the collected data to the Application developed and also alert the users by Natural Language Processing (NLP). It also sends the emergency medical care.

Keywords: Healthcare; Technology; Geographical Information System; IOT; Artificial Intelligence; Cloud Computing;

Introduction:

In the recent researches, prevalence of various diseases such as heart attacks, diabetes has been rising day to day due to insufficient health care resources and improper intimation of their health issues and most of the peoples didn't know their emergency medicines in the needed time in most developing countries. The IoT is a phenomenon where a large number of embedded devices employ communication services offered by the Internet protocols. Many of these devices, often called "smart objects", are not directly operated by humans, but exist as components that are spread out in the environment, such as buildings or vehicles. IOT plays the major role in today's life as the sensors Has the vital role in today needs. Sensors detects our heartbeat, o2 level, temperature etc., According to the World Health Organization, the aging population will rise to nearly 25% of the global population in 2050, and this number can even reach 33% for the developed countries. The issues of elderly health care are becoming increasingly important, because more and more health problems occur with age and some aged peoples can't able to understand the notifications or the alert messages send through the applications such that voice intimation is needed for more peoples. For proper health management, several wearable sensors and the applications have been proved to be useful in remote health maintenance systems for collecting the medical parameters at routine interval and maintaining/observing the data for future purpose. This work proposes an artificial intelligence-based health monitoring system which uses IOT to collect all the medical data of multiple patients

including their heart rate, blood pressure, blood glucose and temperature and would send alerts to the patient's regarding their full medical information up to date, providing a fast and reliable healthcare services. The patient can able to view their medical records at any time and they can check their body parameters whenever needed.

Literature Survey:

According to our survey based on the health kit system The sensors played the vital role in detecting the heartbeat, bp level, oxygen level, temperature level etc., The sensors are now inbuild in our smart watches, mobile phone or the sensors are been manufactured and ware in our body. By the concept proposed by International Journal of Distributed Sensor Networks on Intelligent health monitoring system based on smart clothing, they inserted the sensor in the cloth such that if the user wears the cloth, then the sensors will automatically detect the health conditions to detect these methods, they used the smart clothing collected ECG signals through four electrode patches and then transferred the analog ECG signals to the sensing component through conductive fiber. The sensing component converted the analog ECG signals into digital signals. The G-Sensor of the sensing component was used for collecting the gravitational acceleration (GC)data and by the concept proposed by International Journal of Science and Research (IJSR)

Sensors Used:

As per the literature study, they used the sensors like

- ➢ ECG Sensor
- ➢ Blood pressure sensor
- ➢ Heartbeat sensor
- ➢ Temperature sensor
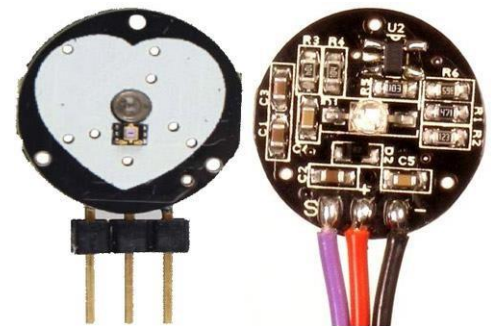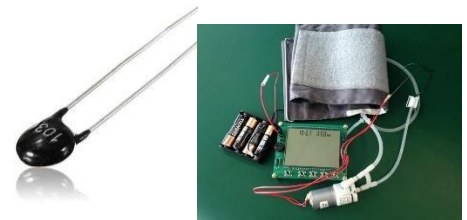
these sensors are proposed already by these sensors the regular body activities are monitored and reported. Electrode detect the tiny electrical changes on the skin that arise from the heart muscles. The AD8232 Single Lead Heart Rate Monitor and it act as an Operational amplifier. The AD8232 is an integrated signal conditioning block for ECG and other bio-potential measurement applications. It is designed to extract, amplify, and filter small bio-potential signals in the presence of noise, such as those created be motion or remote

electrode placement. When the heart beats, it contracts and pushes blood through the arteries to the rest of the body. This force creates pressure on the arteries. Blood pressure is recorded as two numbers,

1. The systolic pressure (as the heart beats)
2. The diastolic pressure (as the heart relaxes between beats).

Monitoring of blood pressure at home is very important for many people, especially for the people having high blood pressure. By these surveys the medical activities are monitoring.

Solution:

According to our literature survey, most of the people are suffering from the intake of emergency medicines at the particular needed time. Such that our idea is to suggest people by their emergency particular needs such that people could easily fulfill their basic emergency needs. Some peoples can't predict their own health issues so heart attacks, abnormal of o2 level, abnormal condition of bp are increasingly raising in today's world. So, our idea is to make people much comfort in analyzing their own health issues, and to maintain their own fitness. some old age peoples and the uneducated peoples can't able to understand the issue detected by the sensor or the notification send in our application, for these issues our suggestion is to inbuild artificial intelligence to build our voice inbuild, according to their own mother language thus every people can be aware of the medical issues and could take their immediate

remedy at the fraction of minute. The alert sound gives the people attention towards their medical problems.

Designed Model:

By our readings Many of them used the sensors and the applications to detect their heartbeat, temperature levels and by using natural language technology they inbuild the voice note thus by our proposed model we connect the IOT and the artificial intelligence thus the readings of the bear beat, temperature, bp are detected by the inbuild sensors available in their smart watches. by the cloning the information is gathered and sends input to the designed application, thus the application has the modules to detect the abnormal and normal conditions of the heartbeat, temperature, etc., If the user send their symptoms as the input to the applications, then the application will give output as the disease or the health issues that the user is affected with and the application will also suggest the nearby doctor and the nearby medical shop. If the user's medical health becomes abnormal the alert signal with voice note will send to the smart watches and to the applications. Within the fraction of second the medicines for the abnormal conditions are also suggested in the applications. If the user set the schedule for the intake of medicines at the particular time the alert signal with voice note is directly send to the smart watch and to the application as well. In the application the user could get the updated notifications on the real-time news.

Modules:

i. User module

ii. Infants' module

iii. Women module

iv. Health care module

v. Symptoms module

vi. Prescription module

vii. Notes

i. User module:

In this module people can able to track their health situation according to the input they gave. User module is also known as adult module in which they can be monitored according to their ages (different aged people needed to monitored uniquely according with their age). People can also add members of their family.

ii. Infant module:

Infant needed to be taken care with more careful and uniquely. In this the vaccination of the infant can be tracked. Vaccination date can be scheduled. The cares that needed to be taken according to the timeline can be known by this module.

iii. Woman module:

In this woman module, woman can be able to track their mensuration cycle. Woman will be alerted when their mensuration time comes. Woman can also able to know about the diets that they have to follow in the mensuration period or to get regular mensuration cycle.

iv. Healthcare Module:

This is the module that the people can able to track their healthcare according to the input they gave. People will be alerted or get notified if they didn't take their medicines or their regular body measures like blood pressure drops or get gets high. This will be identified by the smart watch they wear, it will detect their body's measure and does the action according to the happening. The notification will be like alarm in the smart watch and also voice alert in smart phone because aged people sometimes ignore the notification or can't able to understand it.

V. Symptoms Module:

In this module, when the user has some symptoms and gave their input to the application, our product suggests the precautions according to the input. The symptoms is taken from the user by making them tick the boxes with some symptoms that already in-build in our application.

vi. Prescription module:

In this module, according to the input that the user gave in symptoms module the action takes place. If the situation is little critical it suggests some prescriptions too and also suggests the medical shops that are near the user. If the situation is very critical it also suggests to take look after the doctor and it also suggests the doctors near you or specialized doctor in that field that the user's situation is critical.

viii. Notes

This is a simple module that user can make notes that is related to their health.

Use Case:

Benefits:

- ✓ If the user has smart watch and the app then the body activities are automatically detected and remind the user through the voice note.
- ✓ Users can update over the medical news.
- ✓ If the user doesn't have smart watch, then it will send notification and remainder in app.
- ✓ Prescriptions can be stored in the notes module

Drawbacks:

- Smart watches are not commonly available for every people
- Peoples can skip or swipe up the notification reminders

Conclusions:

Now a days a greater number of peoples are died due to heart attack and some abnormal health conditions to avoid these deaths and to Spread the awareness over their health in among peoples and to intimate the emergency medical care and the intimations our developed intelligent health care system is proposed.

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Interconnected Attendance Tracking System

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ABSTRACT

Teachers use pen and paper for taking attendances which is a time-consuming process. Then they have to update the details to database through typing. Authentication/Biometric Devices are too costly to install and are prone to error.Our proposal is to use Wi-fi/Bluetooth Mesh Networking for proof of presence of students in class. The Software puts a device (student's and teacher's) in a partial mesh network connected through Wi-Fi and/or Bluetooth for inter connectivity and resilience. The teacher's Device acts as a master node and students devices acts as a repeater or end node. Each nodes/Devices are given a unique id to avoid collisions with someone from other classes.

The teacher may initiate an attendance session anytime that they chose to be favourable. The request will travel through the mesh and each student should register they are by confirming their identity (through face reg or fingerprint) and their existence in the class is proven by the fact that range of the Wi-Fi, Bluetooth mesh network is limited. An internet connectivity is not needed as the attendance is taken locally. Any corrections can be done by the teacher. They also have the ability to maintain multiple profiles(classes). The data is then uploaded to a database by teacher's command or automatically after set time. With this approach the tech can work with existing infrastructure. The goal of this software is to be quick and reliable, finish the attendance within 1-2 mins and less paperwork.

Key Points: Mesh Networking, Bio-Metric, Wi-fi/Bluetooth Comm, Database, Peer to Peer.

INTRODUCTION

The objective of the "Interconnected Attendance Tracking System" is used to track attendance using Wi-Fi/Bluetooth mesh networking. In this software teachers and student's devices in a partial mesh network which is connected through Wi-Fi/Bluetooth for interconnectivity and resilience. In this application teacher's node acts as a master node and the student node acts as a repeater or the end node. Each device is given with unique id and that id will be regenerated daily. This new id is created uniquely to avoid collisions with some other classes. In this system, the teacher/authority may initiate an attendance session according to their favourable. The request will travel through the mesh and each student will register they are confirming their identity. That identity may be face recognition or fingerprint). The proof of existence in the class will be marked when their phone is within the limited range of Wi- Fi/Bluetooth mesh network. Internet connectivity is not required to take attendance locally. In this process, the teachers have the authority to change the correction and they can maintain multiple records/profiles. Then after collecting all the data the teacher will upload, it into the database using commands or they will set a timer for uploading it. This process is useful for teachers to take attendance so they can complete the process within a few minutes.

OBJECTIVE

This software aims to optimise the process and improve the quality of life of the teachers, students, parents. The software provides a intuitive page that is used to mark absentees/late comers. Then the details are shared immediately or after a set grace period. If the teacher makes a mistake or the ward turns up late, then they do not have to worry as the control is entirely in their hands (Literally) which makes correction process be anywhere, anytime.

PROBLEM STATEMENT

Teachers all around the world have been dealing with many problems in which most are common, from those the particular one is Attendance tracking. This time-consuming job takes away their focus from their main job which is teaching within the stipulated time. Teachers spend solid 6-15 mins to take and update attendances that, most use pen and paper. Education institutions do have the path to install biometric and authentication devices to improve the productivity of their faculty but it is a very costly and time consuming process, So most institutions is hesitant to undertake this endeavour.

EXISTING SYSTEM

The problem definition for coming up with the system is to consume time for taking attendance and it will be the easiest way to teachers. In existing system, it is manual method in which it takes more time to take attendance and maintain that record in hard copy is difficult. The Existing techniques are RFID technology, Face recognition, Fingerprint recognition.

I)RFID TECHNOLOGY

This software aims to optimise the process and improve the quality of life of the teachers, students, parents. The software provides a intuitive page that is used to mark absentees/late comers. Then the details are shared immediately

or after a set grace period. If the teacher makes a mistake or the ward turns up late, then they do not have to worry as the control is entirely in their hands (Literally) which makes correction process be anywhere, anytime.

DISADVANTAGE

- ☐ Easy to be forged.
- ☐ During crowded situations it cannot scan all the ID cards correctly.
- ☐ Maintenance Cost is High.
- ☐ Prone To Impostring.

II) FACIAL RECOGNITION

Facial recognition AI is used to recognize students who are in the classroom and mark them as present.

DISADVANTAGE

- ☐ Expensive Hardware needs to be installed.
- ☐ Possibilities of False Positive and True Negatives.
- ☐ Computational Power requirement is high

III) FINGERPRINT SCANNING

Fingerprint scanners are placed at the entrances of a classroom in which students have to use for marking their presence through their Bio-Identification.

DISADVANTAGES

- ☐ Cumulative accuracy decrement overtime due to dust build up.
- ☐ Privacy Concerns because of possibility of security leaks.

- ☐ Need to be maintained regularly

PROBLEM IDENTIFICATION

- ☐ External hardware is required.
- ☐ Risk of identity theft.
- ☐ Maintenance of hardware.
- ☐ Unreliable during crowded situations.
- ☐ Can create a choke point in the workflow.

PROPOSED SOLUTION

Our proposal is to install a software into every stakeholder's phone who includes Teachers, Student, Mentor etc. This software manages the creation, maintenance, termination of the network and distribution of the credentials and data through the network to the master device. The Nodes (Devices which have the software and is belong to a verified and valid user) are primarily connected via Wi-Fi and as a fall back via Bluetooth. The Wi-Fi and Bluetooth are selected because they facilitate local data sharing and is limited in range. The former is important because the operation must not rely on external internet for its operations and the latter is important because it will prevent students who are not in the class or not near the verifiable range around the class from connecting to the network. These two characteristics also act as our authentication protocol as the student must have to be within the class to mark their presence. The network connection configuration of the created network is a partial mesh network in which each nodes are connected to other nodes and it is partial because only up to 5 other nodes are connected to any given node instead of connecting every other nodes. This is

strategically chosen because of the mesh network's Healing and Reliable data transmission capabilities. This also act as yet another authentication procedure as a student's transmitted data is valid only if their device is connected 5 random devices and so prevents any spoofing. Now after every student in the class had been connected to the network, the attendance taking procedure will be started. The teacher will initiate the attendance taking session by pressing the "Take Attendance" button. The app will then create the Wi-Fi id and a asymmetric key pair exclusive to that session. The app then creates the Hotspot signal and up to 5 students can connect to it. The rest of the students can then connect to the network through the already connected students as every node connected to network also act as a Wi-Fi repeater. The Students can then register their attendance using either their fingerprint or face recognition which will processed and verified by their phone. The response will then be bounced back to the Hive mind (Teacher)'s device which will register their presence and updates the database. The Database is then uploaded to the local college network automatically.

USE CASE
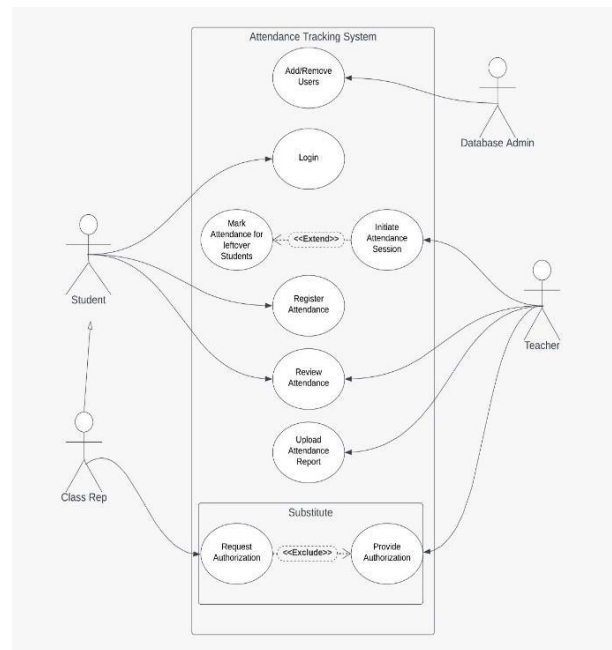
ARCHITECTURE
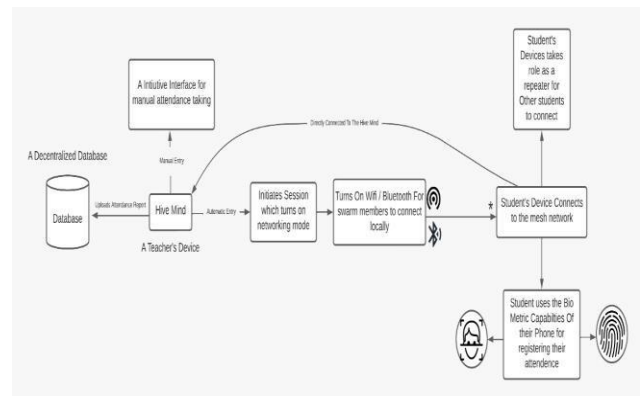
FEATURES

I) Session Initialization Module.
II) Swarm net-worker.
III) Load balancer.
IV) Bio-Metric
Scanner.

I) Session Initialization Module

Session Initialization Module is tasked with only one task which is to Set up Wi-Fi and Generate Key for that session.

II) Swarm Networker

This Module takes the job of connecting all the devices to the Hive Mind and routing the information through swarm.

III) Load Balancer

This Module makes sure that all the devices are overwhelmed by having multiple connections. It reconfigures and redistributes the network whenever that happens.

IV) Bio-Metric Scanner

This Module interfaces with the Local OS for utilizing the Bio-Metric Capabilities of the Device.
`

ADVANTAGES

I) No theft will occur.
II) Missing of data will not take place.
III) Time saving.
IV) No illegal attendance markings.

FUTURE ENHANCEMENT

☐ Monitoring Mode: The app works at background checking whether all devices are connected.

☐ Upgrading/Downgrading Nodes: The software makes the mobile device to switch to low power Bluetooth to conserve battery.

☐ Inheriting the Hive Mind position to another device in class in case of any issues.

☐ Blockchain: Develop a true decentralized database using blockchain.

CONCLUSION

Attendance Taking is still remains as the one of the time consuming yet important process in the workflow of a class management. We firmly believe that our work in this project will not only make it cost effective and efficient but also a peaceful one for teachers to go through.

LAYERS OF WEB

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Abstract - *The Internet is the World Wide System ofinterconnectednetworksofcomputerwhichusesprotocolssuchasTCP/IPprotocolsuitestocommunicate between group of network and devices.Here comes the web, which is the only way to get theinformation through the internet. Web is the Internetsystem servers that mounts formatted documents. Thelayers of web is mainly classified into three types, theyareSurfaceWeb,Deep WebandDark Web.Theselayersareinterconnectedtoeachother.SurfaceWebis the part of the internet which is unrestricted to thepublic and can accessed through search engines likeGoogle, Microsoft Bing, Yahoo Search and so on. Thissurface web only comprised of just 4% of the completenet.DarkWebisapartofwebwhosedataandinformationarenotindexedbystandardsearchengines. This layer of web is opposite to surface weband it covers 96%of the remaining web. The DarkWeborDarknetisalwaysconfusedwiththeDeepWeb. It isaccessibleonly throughnetworkssuch asTor that are created specifically for the dark web. DuetolayeredencryptionsystemwecannottracktheIdentities and Location of the darknet so that they stayanonymous.Inthisarticle,thelayersofwebisanalysed and mainly the basic knowledge of dark webis obtained and this may prevent the vulnerabilities insecuritythreats of anindividual.*

INTRODUCTION

In this article, I'll talk about the various web layersandwhatwemayhopetoseeoneachone.TheWorld Wide Web (WWW) and the Internet are twotermsthatmostinternetusersusefrequently,sobefore I get into the web layers, readers should beable to tell them properly. For instance, the Web is acollectionofinformations.

Webpages-accessedviatheinternet,buttheInternet is the network and IT infrastructure neededtoaccessitemsontheWeb.Websoftwareprogrammeshavedevelopedintosophisticated,complexprogrammesthatarebasedoncutting-edgecomputingtechniques.Theirprimarydistinguishing featureisthatthey offerauniqueapproach to software deployment; the majority ofthe software is never transferred to customers' PCs,instead staying on servers so that users can access itovertheinternet.Whilebrowsingtheinternet,every tech-savvy person must have run across theterms surface web and dark web. If a user is unsureofthetypeofinternettheyareaccessing,theseterminology can be confusing. The surface web andthe dark web are essentially two separate types ofinternetbrowsersusedbyvarioustypesofconsumers.

Cyberspace isenormous,far larger thanwhatwe can see when using the internet and performingotherroutinebrowsingactivities.Theprecisesizeof the web is unknown. However, the ongoing useof IT in all aspects of everyday life, along with thedaily increase in users, will obviously cause the rateat which web content increases to be unpredictable.Whenperformingroutineonlineoperations,themajority of internet users only browse the surfaceweb. The surface web is the part of the internet thatis normally accessible by search engines,allowingthemtoindexitscontent.Thedeepwebisthesecond layer of the internet. The dark web, oftenknown as the darknet, is a hidden sublayer of thislayer,whichisthelargestintermsofsize.Astandard web browser like Firefoxor Chrome canbeused to visit thesurfaceand deep web.

Thedarknet,whichrequiresspecialisedsoftwaretoaccess,is an exception.

SURFACEWEB:

The area of the World Wide Web that is easilyaccessible to the general public and searchable usingcommon web search engines is known as the SurfaceWebwhichisalsoknownastheVisibleWeb,Indexed Web, Indexable Web, or Lightnet. It is theantithesisofthedeepweb,theareaoftheinternetthat is not indexed by a search engine. Only 10% ofthe content on the internet is contained in the SurfaceWeb. The Surface Web is created using a collectionof publicly available Web sites on a server that isreachable by any search engine. In their routine dailyactivities,individualsusetheSurfaceWeb.Itisaccessibletothegeneralpublic viawell-knownsearch engines and may be seen using well-knownwebbrowserslikeMozillaFirefox,Microsoft'sInternet Explorer or Edge, and Google Chrome thatdon'tneed anyadditionalsettings.

When you enter a search term, the search enginewon'tdothesearchacrossthe entire web.Itwillinstead do a search within its own database and

thendeliverpertinentresultsasaconsequence.This,incidentally, differs from how our Federated Searchfunctions.Webcrawlers,commonly referredtoasweb spiders or bots, are used by search engines tobuild these index databases. Imagine the crawler as aprogram that automatically browses the internet insearch of fresh material. All links are followed by aweb spider when it finds a new page. The outcome ofthecrawling procedureisforwardedtotheglobalsearchindex,ahugedatabasethatorganizesalldetectedcontentstomakeitsimpletoretrieveinformation.Toguaranteeahighleveloffaccuracy,

search engines do not add all webpages that arefound to the index database because the informationon the webpages must have value (e.g., be unique,current,accurate,andfromareputabledomainname) for the searcher to be taken into account intheindexdatabase.

Now,asearchenginelikeGooglewillutilize a user's search query to look up the result inthe search index when the user enters the searchengine and submits a search query. Search resultsaredeterministictocreateapleasantuserexperience:Ifyouconductthesearchtwicequickly, the results will be the same. In order tooffer the best response to a searcher's query, searchenginesuseasophisticatedalgorithmforresultranking. Remember that Google ranks differentlythanYahoo,Yandex,Bing,andothersearchengines.Thisfrequently makesyourOSINTinvestigations more difficult, and it's also the reasonwe rank each customer separately on top of all theresults from various data sources. An easy approachfor internet users to browse the web is by usingsearchengines.Evenasawebsiteprovider,youhave the power to start and

control the indexingprocedure. The Deep Web is the next layer of theinternet,yet alot ofwebsitesarenotcrawlable.

DEEPWEB:

The term "deep internet" describes areas of theinternetthatarenolongercompletely accessibleusingwell-knownsearchengineslikeGoogle,Yahoo, and Microsoft. Price-for-service websites,personaldatabases,previouslyunindexedpages,and the black web are all examples of the deep web.Customers can access much more data through thedeep web than would otherwise be possible on theinternet,andit alsoimproves privacy.Thedeep

web has perhaps received the most severe criticismfor undermining the net's openness and equality. Thedeep web, which is also known as the hidden net orinvisible internet, is distinct from the surface web,where content may be found by search engines likeGoogle. Every search engine uses bots to trawl theinternet and add any new content they find to theirdatabase.Althoughthesizeofthedeepwebisn'tusually appreciated, many experts believe that lessthan 1% of all online material is really crawled andindexed by search engines. The surface web refers totheinternet'ssearchablematerial.Therearetimeswhen the deep web- Knowing the exact web addressto use is frequently the only way to find such sites,even if they are listed with popular search engineslikeGoogleandYahoo.Somespecialisedwebsitesorsearchengineslistaselectnumberofdeepwebpages.Forinstance,siteslikePubMed,LexisNexis, Web of Science, or Project Hope can

beusedtofindacademicpublicationsinthedeepinternet. The deep web contains a lot of legal andnon-criminalstuff.Thevastmajorityofinterne
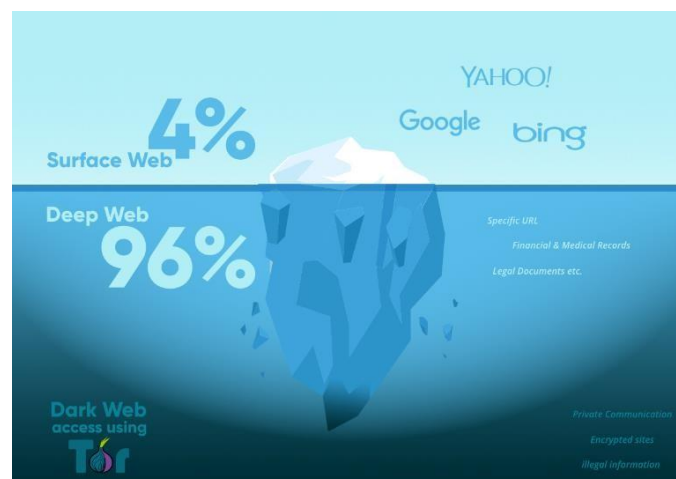
tusers regularly access stuff on the deep web becauseitisincredibly secure todo so.Accessing statisticson a deep net site can also be done by logging intoLinkedInor Gmail, toname just twoinstances.

The deep net, which makes up about 90% of allwebsites,liesbeneaththesurface.This wouldbeafar larger portion of an underwater iceberg than thesurface internet. It's actually impossible to determineexactly how many pages or websites are active at anygiven time due to the size of this hidden net. Keepingwiththeanalogy,largesearchenginescanbecomparedtosmallboatsthatcanonly"catch"webpages near to the bottom. Everything else is outof reach, including scholarly papers, secret databases,andmorecriminalcontent.The deepnet,whichmakes up about 90% of all websites, lies beneath thesurface.Thiswouldbeafarlargerportionofanunderwatericebergthanthesurfaceinternet.It'sactually impossible to determine exactly how manypages or websites are active at any given time due tothe size of this hidden net. Keeping with the analogy,large search engines can be compared to small boatsthat can only "catch" webpages

near to the bottom.Everything else is out of reach, including scholarlypapers,secretdatabases,andmo recriminalcontent.

Some of the biggest elements of the deepwebinclude:

Databases:

Filecollectionsthatmaybesearched mosteffectivelywithinthedatabaseitsel f.Thesefilecollectionscanbebothpublic lyaccessibleandprivatelysecured.

Intranets:

Privatenetworksusedbybusinesses, governments,andacademicinstitutions tocommunicateand manageinternal processes.

Thekeyfindingsinclude:

- The current size of the public on the deepWeb is 400–550 times that of the popularlyunderstood World WideWeb.
- Compared to the regular Web's 19 terabytesofdata,thedeepWebco ntains7,500terabytesofrecords.
- In contrast to the floor Web's billion distinctfiles,thedeepWebconta insalmost550billion.
- There are already more than 200,000 deepWeb sites.
- Together,sixtyofthetopdeep-Webwebsites have around 750 terabytes of data,which would be enough to dwarf the surfaceweb byafactor of40.
- Deep Web sites receive 50%

more monthlytrafficthansurfacesites onaverage,andtheyaremorestro nglyrelatedtooneanotherthansu rfacesites,althoughtheusual (median) deep Web site is not wellknowntoInternet users.

- The deep Web istheInternet's largesttypeof newlydevelopinginformation.
- Comparedtotypicalfloorwebsit es,deepWebwebsitestendtoben arrowerandcontainmoreconten t.
- The deep Web has 1,000–2,000 times moreoverallexcellentcontentth anthesurfaceWeb.
- DeepWebcontentisparticularly pertinenttoeveryinformationne ed,market,anddomain.
- The deepWebcontainsmore than 50% ofitsmaterialinsubject-specificdatabases.
- Ninety-fivepercentofthedeepWebisfre ely available information; it is not subjecttocharges or subscriptions.

First, despite being vital for information search,the deep Web is still mostly unexplored at this point.Neitherisitwellsupportednorunde rstood.Accessto the deep Web is not sufficiently supported, as seenby theinadequateprotectionofbothitsfactsa nddatabases(viadirectoryservices)usin gsearchengineslikeGoogle.Thisstudyai mstobetterunderstandthedeepWeb.The deepWebdoesresemble the surface Web in a few areas: It is large,expanding quickly, and varied. Second, even thoughthecrawl-and-indexstrategieswidelyutilisedbywell-knownsearchenginesthesedayshavebee nextremely successful for the surface Web, such anaccess version may not be ideal for the deep Web.Duetothehiddenanddynamicnatur

eofWebdatabases,thefirstconstraintthat crawlingmayencounter is one related to insurance. Additionally,given the wide range of deep Web data, structuralheterogeneitywilllikelypresen tachallengeforindexing the facts that have been crawled: Althoughserving the ground-Web pages properly, the currentkey-word-based indexing (which all search engineslikeGoogleandYahooperform) willignoretheschematic"structure"avail abletothegreatestextent.

DARKWEB:

Parts of the internet that are not entirely availableby popular search engines like Google, Yahoo! arereferred to as the "deep web." The deep web consistsofwebsitesthatwerenotindexed, fee-for- service(FFS)websites,internalnetworks ,andsecretdatabases. The deep web, which is distinct from thesurfaceweb,wherecontentcanbeacce ssedbysearch engines, is also known as the hidden web orinvisibleweb.Sincesearchenginescan accessinformationonwebsiteslikeInvest opedia,itisconsidered to be part of the surface web. The deepwebisthoughttobesignificantlylarg erthanthesurfacewebbythemajorityofsp ecialists.Manyonline pages are developed dynamically or may notcontain links to other websites. The search enginesare unable to find them without links from alreadyindexed sites. Because of this, obtaining links fromother websites is a fundamental component of searchengineoptimization(SEO).Thede epwebalsodependsheavilyonprivatedat abases.Privatedatabasesmightbeasstrai ghtforwardasafewimagessharedonDro pboxbypeers.Theyalsoconsistofpayme ntsmadethroughwell-

knownwebsiteslikePayPal.Thedesireto maintainthisinformationwithoutmakin gitavailabletothe

generalpublicistheprimarycharacterist icofprivate databases. As opposed to the surface web, itnowbelongs to thedeepweb.
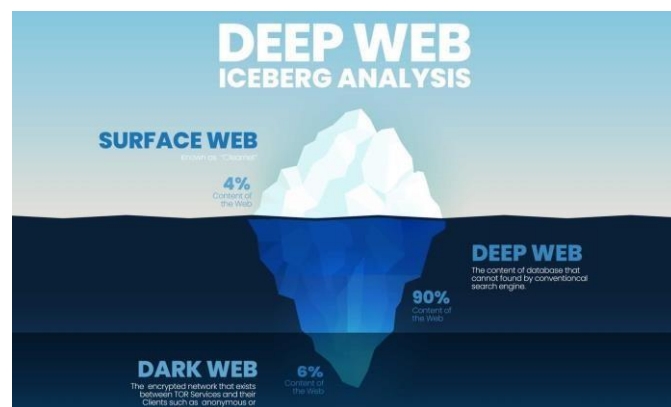
The deep web—the portions of the internet thatare not indexed by search engines—and the darkwebaresometimesconfusedwithon eanother.Althoughthephrase"darkweb "originallyappeared in 2009, it is unclear when the dark webitselffirstappeared.Manyinternetu sersonlyaccess the information available through standardweb browsers, or the surface web. Although it onlymakes up a minor portion of the deep web, the darkwebrequiresspecialisedsoftwareto accessitscontent.Thismisunderstandin gbeganatleastin2009.

Only networks designed particularly for the darkweb, such as Tor *("The Onion Routing" project),*provideaccesstothedarkweb,a lsoknownasdarknet websites. Users of the darknet frequentlyutilise the Tor browser, which is also used to visitwebsiteswiththe.oniondomain.To rbrowsersprovideuserswithencrypteda ccesspointsandpaths,enablingthemtoc onductanonymoussearchesand otheractions ontheblack web.

Since then, despite suggestions that they shouldbe separated, the two names have frequently beenused interchangeably, particularly in reporting onSilkRoad.Duetothemultilevelencryptiontechnology,usersofthedarknetcan remainanonymous and have their whereabouts untraced.Darknetencryptiontechnologyprotectsusers'identities and ensures anonymity by routing users'datathroughalargenumberofintermediaryservers. Only the next node in the scheme, the onethatleadstotheexitnode,maydecryptthetransmitted data. It is nearly impossible to duplicatethe node path and decrypt the data layer by layerduetothecomplexstructure.Websitesareunable

to trace users' IP addresses and geolocations due tothe high level of encryption, and users are unable toobtain this information about the host. Because ofthis, darknet users can speak, blog, and share filesprivatelythanks to highlysecuredcommunication.
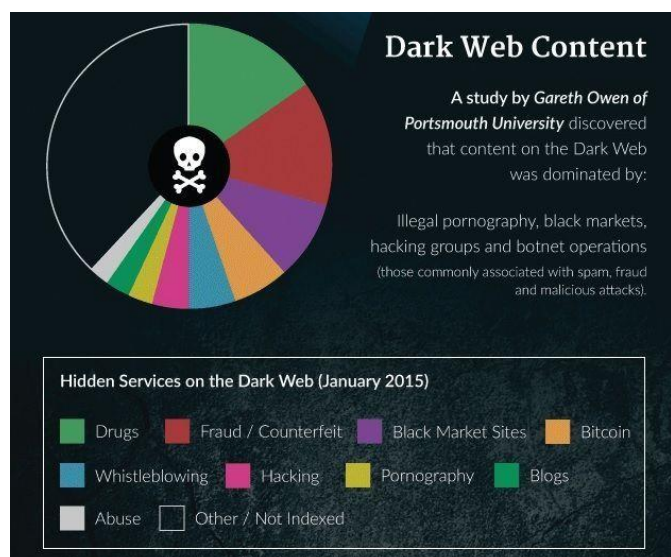
PROSOFDARK WEB:

TheDeepWeboffersawealthofdataandinformation. It has more virtual libraries than you canimagine, some of the biggest. Teachers, students, andresearchers frequently access the knowledge on theDeep Web because it is not as easily accessible ontraditionalsearchengines.Althoughsomepeopleview anonymity as having two sides, itshould becherished because it leads to freedom. Accessing theDark Web with encrypted browsers like Tor, whichensures that your IP address cannot be tracked, issafe.Alwaysuse TorwithanunderlyingVPN toincrease security. Political Activism - Throughout theworld, right-wing authoritarian governments are ontheriseandworkingtorestrictcriticism andfreeexpression. Information control is a potent tool forsuch regimes, and they monitor the online activitiesandmovementsofitssubjects.Governmentscanchoosetorestrictspecific websitesinnumerousnations,whichistypicallydoneforsocialnetworkingplatforms.

CONSOFDARKWEB:

Due to Drugs and illegal substances The DarkWeb is a sanctuary for illicit activity connected to thetradeinillegalsubstances.TheSilkRoad,whichwas

accessible on the Dark Web, was one of the mostwell-knownmarketsforillicitgoodslikedrugs,guns, and other items. You should exercise extremecaution as a user when using the Dark Web becauseit is quite simple to get seduced by the availabilityof such things, which will ultimately get you intoproblems. On the Dark Web, child pornography iswidely available. Although that is a

reality, we arenot proud of it. On a daily basis, the black webtradesliterallygigabytesofchildporn.Suchwebsites should be avoided since participation onthemis immoral and unethical.

On the Dark Web, you may purchase weapons,but you can also discover contract killers for hirewho will accept a contract in exchange for money.There is no control, thus this conduct takes place ontheDark Web completelyunchecked.

Key Difference between Deep Web vsDarkWeb:

- Deep web is usually used for legit purposesthat require anonymity, but the dark web issometimesused forillegalactivities.
- ToaccessDeepWeb,yourequire apassword, and encryption, whereas to accessthe dark web, you require Tor Project or asimilarbrowser.
- BothDeepandDarkWebarehid denandnotshowntoconvention alsearch engines.
- DeepWebislargerthantheSurfa ceweb,ontheotherhand,theDar kwebsizeisunmeasurable.

CONCLUSION:

Althoughthe focusof this study has beenondeviance on the Dark Web, it's crucial to keep inmindthatthisisjustasmallpercentageoftheentireDarkWeb'scontent.Thereissomuchdifferentinformationavailable that it makes senseto concentrate on some elements; it's comparable tousingfanfictiontorepresenttheentiretyoftheInternet.WhiletheDarkWebisatoolforextremistsandpaedophiles,itisalso

usefulforacademics, government employees, scientists, andanybody else seeking anonymity.ANewEnglandlawyerwho maintainsananonymousblogonthe

Dark Web as an example of this is one who fears thatsharing his opinions on various topics may harm hiscareer.

Thepurposeofbringingattentiontotheseaberrant subcultures on the Dark Web is to show thatthey don't just exist online. Dissidents have existedforalongtime,andpaedophiliahasbeendocumented in history books for a very long time.Thefactthatthesesubculturesarecompelledtowithdraw to the Dark Web, where they are mostlyfreetopursuetheirinterests,asaresultoftherestrictionof theSurfaceWeb, is novel.

Relegatingsubculturestoaparticularlocationwhere they are hidden from view does not put an endtothem;on thecontrary,itgivesrisetostrongergroups.

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LoRa ENABLED SMART IOT BASED INTEGRATEDHOME SECURITY SYSTEM

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Abstract

All over the world, security has been a major concern in everyhome. Automated home security systems are a useful addition to today's home where safety is an important issue. In the era of industry 4.0, remote monitoringand controlling appliances/equipment   at home from a long distance with low power   consumption remains challenging.   Atpresent, smart phones   are being actively used to control appliances   at home   or institutes   using Internet of Things(IoT) systems.
This paperrepresents   a   novel   smart automation   system using long range(LoRa)   technology. The   proposed LoRa   based   system consists of wireless communication   system   and different   types   of   sensor,

operated by a smartphone application and powered by a low-power battery, with an operating range of 3-12 km distance. The ESP32 module was connected to a LoRa module at the sender end and receiver end

Keywords—LoRa,   Flooring System, IoT, Security, Sensor, Theft, Thief, House, Camera.

1. Introduction:

In today's high-speed world, security plays a significant role. People are now more concerned about their belongings like valuable documents, jewelry, and much more material. Some People prefer their home to keep all their valuables. The presentsituation ensures that the safety and security has become more essential. There is a regressive

progress in the security system as the influence   of   modern technology is reaching its maximum limits. When there is a modern   home with   minimum human needs,it is said to be a modern   house. The   automated house   security system   can   be implemented with   the surveillance camera and multiple sensors,   and   the use   ofthese sensors will   be   defining   the characteristics of these sensors. Speed   data transmission takes place while using the LoRa to security systems which helps the user to control and monitor the system   Theneed   for   video surveillance systems are rapidly increasing in the present day. The things people want to know about their security surveillance system is whether or not they have the ability to connect to itover the internet for remote monitoring. In the past, security surveillance systems had to be viewed by a person who waslocked away in a room all day monitoring the systems to makesure that nothing bad happened. The other way was to come back and review the footage but thereis a chance of damage to the footage.

2. LITERATU REREVIEW

There are multiple solutions proposed for the security system provided with IoT facilities that have been proposed and inventedin the literatures which helps the solid security system improves the quality of service delivery.The LoRa module adopts a modulation technique that is capable of transmitting 300~19,200 bps data on   air where transmission consumes 5~20 dBm power with a maximum distance of 12 km. In contrast, the widely used short- range technologies such as Bluetooth, Wi-Fi, and ZigBee are not best suited where LoRa has the ability to cover a wide area while   consuming   low   power   and   using inexpensive wireless connectivity [1]. In this paper, a LoRa based automation system is

designed and developed to control appliances such as light, fan, TV, AC, car, and so on. Automation system that iscontrolled by ESP32 and LoRa

with LoRaWAN communication protocol leverages the unlicensed radio spectrum in the Industrial Scientific and Medical (ISM)band [1].The LoRa based system can overcome the challenge of low power *communication.* An application has been developed to use a smartphone to control and monitor the target appliances through the LoRa module. Over the last few years, scientists and experts introduced various automation systems for makinghuman life smooth and easy. The earlier systems main*ly* focused on home automation, automatic irrigation system, robotics in automation for home and industry, and laboratory automation. Automation systemthat is controlled by LoRa with LoRaWAN

communication protocol leverages the unlicensed radio spectrum in the industrial, scientific and medical (ISM) band[2].Furthermore, LoRaWAN can handle the data losses when different nodes are increased to 1000 per gateway [3]. An IoT based automation system which can remotely control home appliances using a web server ispublishe in [4]. The system provides security for signal interaction using an android application. The system also controls several home appliances remotely through the internet using a micro controller, sensor, and Wi-Fi module.Ab et al. [5], developed a home automation system using an android phone and a Raspberry Pi. A smart system is presented by More etal. [6] for monitoring home equipment where the authors used a Wireless Sensor Network (WSN) and Message Queuing Telemetry Transport (MQTT) protocol to interact between home appliances and users. For some selective sensors,WSN runs out of energy. Another IoT based automation system was proposed in [7]which could control and monitor home via

mobile phonethrough internet connection.

3. PROPOSED SYSTEM

The EdgeX uses LoRa to transmit video and image data over hundreds of kilometers without the internet using the onboard AI processor. No internet No problem as LoRa is

up to the rescue. LoRa is a technology with the help of which we can easily transmit data to a range of kilometers without any internet and EdgeX which works on the amazing LoRa technology. AI based and is very much suitable for the transmission of image and video data over the hundreds of hundreds of kilometers that is without the internet. Primarily, the proposed system has been divided into two parts. The first part is known as the sender end, where the system interconnects users' mobile phone to an ESP32 module using wireless network. Then the ESP32 module is connected to a LoRa module for transmitting data. The secondpart is the receiver end where a LoRa module is integrated with the ESP32. In this part, wired connections are made with several sensors and the ESP32 module.The receiver side is interconnected with the home appliances.It also has a Mic installed to get audio input and perform audio analysis.EdgeX module is AI powered and uses a Neural Network Accelerator to process image and video data, extract relevant data from that which is sufficient for the transfer

of data and its recreation at the receiver end and send relevant data to the cloud for transferring it to the receiver. .

4. LoRa MODULE

The RYLR896 transceiver known as LoRa module provides fanatical long-range spectrum for establishing intercommunication and reliable interference security with low power consumption. This made the automation system more robust. A microcontroller and an antenna were integrated with a Printed Circuit Board (PCB). LoRa has a built-in SimTech SX1276 engine and 127 dB dynamic range RSSI that enables controlling differentappliances from 3 km to 12 km distance.

5. ESP32 MICROPROCESSOR

The system used ESP32 microprocessor which was a robust and adaptive module with many built-in functionalities. This module was

assembled with different hardware devices. It acted as a bridge between the user application and the LoRa module at the sender end through

Wi-Fi connection, between different sensors and controlling switches at the receiver end through wired connection.

6. SENSORS

Motion sensor: Motion sensors should be placed in a main entryway or hallway on the ground floor of a home so that they can detect motion and alertus when our system is armed.
Some motion sensors are sensitive to pets, so they don't gooff every time our dog walks by. **DHT11 SENSOR:**The DHT11

is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serial data.

FLAME   SENSOR:A   flame-sensor is one kind of detector which is mainly designed for detecting as well as responding to the occurrence of a fire or flame. The flame detection response can depend on its fitting. It includes an alarm system, a natural gas line, propane & a fire suppression

system. This sensor is used in industrial boilers. The main function of this is to give authentication whether the boiler is properly working or not. The response of these sensors is fasteras well as more accurate compared with a heat/smoke detector because of its mechanism while detecting
the   flame.   Working   Principle   This sensor/detector can be built with an electronic circuit using a receiver like electromagnetic radiation. This sensor uses the infrared flame flash method, which allows the sensor to work through a coating of oil, dust, water vapor, or otherwise.
Flame Sensor Module: The pin configuration of this sensor is shown below. It includes four pins which include the following. When this module works with a microcontroller unit then the pinsare,

● Pin1 (VCC pin):
 Voltage supply rages from 3.3V to 5.3V

● Pin2 (GND): This is a ground pin

● Pin3 (AOUT): This is ananalog output pin (MCU.IO)

● Pin4 (DOUT): This is an

analog output pin (MCU.IO)

A. *Figures and Tables*

 The MQ2 SENSOR: The MQ2
sensor is one of the most widely used in the MQ sensor series. It is a MOS(Metal Oxide Semiconductor) sensor. Metal oxide sensors are also known as Chemi resistors because sens in is based on the change in resistance of the sensing materialwhen exposed to gasses.
MQ2 gas sensor operates on 5V DC and consumes approximately 800mW. It can detect LPG, Smoke, Alcohol, Propane, Hydrogen, Methane and Carbon Monoxide concentrations rangingfrom 200 to 10000 ppm.

7. CONCLUSION

We have introduced a solution for regular users by providing a complete home automation system. The users can easily afford this solution in their daily activities. Wehave developed an android application that enables users to operate all the electronics components. To ensure the entire home automation, we have employed LoRaWAN technologies with

Bluetooth connectivity, a server- based LoRa gateway mechanism. If a user remains in a short-range, Bluetooth will be used. Besides, we have conducted a system usability scale (SUS) to check whether a regular user is satisfied or not. The developed model has attained a sus-score of 93%. However, these integrated home automation systems will be very practicable, active, and convenient.

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9660%2F5%2F1%2F17%2Fpdf&psig=AOvV
aw3nf04x7yyzKd_48s6QUthH&ust=16646.

5

Machine Learning based Trend analysis and Forecasting of COVID-19 using LSTM

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Abstract:The carry out of Covid (Coronavirus) in the whole every nation has endangered the humanity. The resources of without a doubt the greatest economies are stressed in light of the colossal infectivity and infectiousness of this disorder. The limit of AI models to guess theamount and number of looming people groups impacted by Covid which is eventually took as a potential risk for humanity. In particular, Three layer of deciding models, least altogether shrinkage and decision manager (Rope) Backing vector Machine - profound learning have been used in this examination to assess the subverting parts of Covid. Least Three sorts of assumptions are proposed by all of the frameworks, similar tothe amount of as of late spoiled reports, the amount of passing's, and the amount of recoveries Yet in the can't anticipate the specific result for the patients. To overcome the issue, Proposed technique using the long Short - term Coordinated Normal (LSTM) predict the amount of Coronavirus cases in next 30 daysahead and effect of preventive evaluations like social isolation and lockdown on the Carry outof Covid.

Keywords — **corona virus, COVID-19, SVM, LSTM, Machine Learning, LASSO.**

INTRODUCTION

Covid, the most horrendously awful pandemic that is rollout all over the planet, has revealed the shortcoming of Individuals culture to outrageous compelling sicknesses and the difficulty of dealing with this issue in a globally interconnected complex system. Covid impacted more than 100 countries in a scope of weeks. Thusly, the whole human race should collaborate to overcome the plague as well as reasonably arrange to return to work and creation according to the certifiable situation of each and every area and do geographical peril evaluation. Various undertakings have been directed to find a fitting and fast way to deal with recognize corrupted patients in a starting stage. Directly following making chest CT ranges of 21 patients sullied with COVID19 in China, Guan et al found that CT look at assessment included corresponding issues, on occasion with a changed body and a periphery lung flow. Consequently, Covid assurance can be addressed as an image division issue to isolate the essential features of the infection.The ailment achieved by the clever Coronavirus, or Covid Sickness 2019 (Coronavirus) is quickly spreading globally. It has polluted more than 1,436,000 people more than 200 countries and areas as of April 9, 2020.

RELATED WORKS

Estimating data have wide applications, e.g., region based anticipating, and numerical reach requests (i.e., finding centers inside numerical domains, e.g., circles or polygons) are one of the significant chase limits over spatial data. The rising interest of re-appropriating data is moving gigantic degree datasets, including huge extension spatial datasets, to open fogs. Meanwhile, in light of the concern of insider aggressors and developers onopen fogs, the security of spatial datasets should be carefully safeguarded while addressing them at the laborer side, especially for region based and clinical

usage. In this paper, we formalize the possibility of ES Accessible Encryption, and propose a compelling arrangement, named Tether, To guarantee the precision of determining datasets set aside and addressed at an open specialist.

DATASET

>Covid19 Testing Dataset

>Covid19 Training Dataset

We will group those regions and categories of the affected areas for classification.

Low(minimum)

Medium(average)

High(maximum)

MODULES

A.DATA

The data information consolidates the all out certified cases, the complete number of passings, as of late avowed cases, and the total number of eased cases regions. We also used the data on the new ends in South Korea, Iran, and Italy, it consolidates the data, and here, the data comes from genuine alerts from various countries.

B. PREPROCESSING

The data has been used (when the essential occurrence of Coronavirus was represented in India) with 80% data is used for getting ready and rest 20% for deciding and endorsement purposes. The resulting plot showing without a doubt the quantity of certified cases, the saw data is the data used for the end goal of planning, official data (green line) exhibits the power data open and decided data shows the figure of a total number of insisted cases. Data Pre handling is a strategy that is used to change over the unrefined data into a perfect educational list.

The dataset is regularly partitioned, conflicting, and besides crippled in unequivocal practices or floats, and is apparently going to contain different blunders. Information pre dealing with is a shown procedure for settling such issues.

C.PREDICTION

This strategy is appropriate to involve prescient brain organizations or trademark information as such disease occasion or non-occasion binomial impacts. The expectation exactness of different estimations can be utilized for various purposes. They incorporate the rate at which typical (non-anticipated forecast accurately predicts responsiveness (non-irresistible sickness), exactness(anticipated level of anticipated pattern), positive prescient worth, negative prescient worth (accurately anticipated contamination rate is)), the proportion is Normal expectations are a proportion of the probability that the expansion in the whole cycle surpasses the precision of the person).

D.CLASSIFICATION

The data classifier we using a couple of AI techniques to predicts the goal class for each instructive record point. With the help of the gathering approach, a peril element can be connected with infections impacted people groups by separating their instances of sicknesses. So we executed computer based intelligence approach of LSTM method
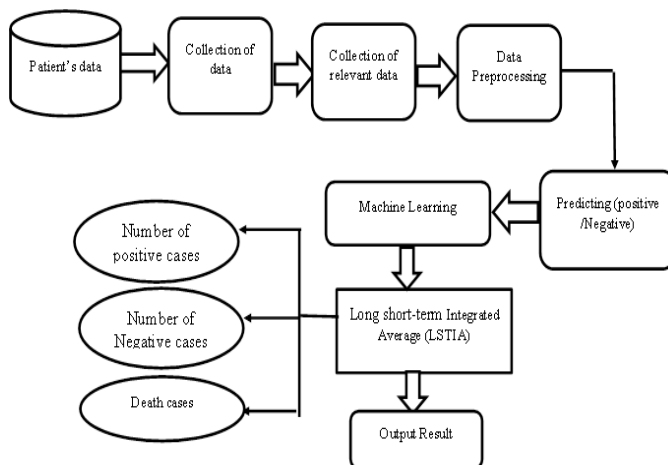
EXISTING SYSTEM

Coronavirus disorder is by and by saw as a potential risk to mankind. In five model of AI conjectureframeworks, similar to straight backslide (left to right), in any occasion total rundown and selectmanager, Backing Vector profound learning, have been used to expect Covid sickness compromising

factors in this assessment. Conjectures are made on all of the frameworks, similar to the amount of new sicknesses, the amount of passing's, and the amount of rehashes all through the accompanying 2 days. For the effects of the examination it shows a promising instrument for the use of these methods in the stream setting of Covid disorder illness. Assumptions are made on all of the frameworks, similar to the amount of new sicknesses, the amount of passing's, and the amount of rehashes throughout the span of the accompanying 2 days. For the effects of the examination it shows a promising partfor the use of these methodologies in the energy setting of Covid disorder pollution

PROPOSED SYSTEM

Artificial intelligence methods turn out to be convincing for assumption due to normally removing significant features from the readiness tests, managing the foundation from the previous time experience as responsibility for the ongoing time step and affiliations self-affiliations. As shown by the outcomes of the model examination, we acknowledge that the emergency intercession gauges embraced at the outset period of the epidemic, such as blocking, restricting the movement of people, and growing the assistance, controllingly affected the main spread of the plague. It is a very convincing aversion and treatment system to continue to extend interest in various clinical resources for ensure that conjectured patients can be dissected and treated in an optimal manner.

The scourge floats long flitting Incorporated Normal (LSTM) of were first fitted and taken apart to exhibit the authenticity of the ongoing mathematical models. The assumption outcomes of three unmistakable mathematical models are different for different limits and in different districts.

The estimate got by the proposed methodology for various parts (number of positive cases recovered number of cases, etc) will be exact inside a particular reach and will be a productive instrument for heads and prosperity authorities. The outcomes were then used to fit and separate the situation of Corona virus.

RESULTS AND DISCUSSION
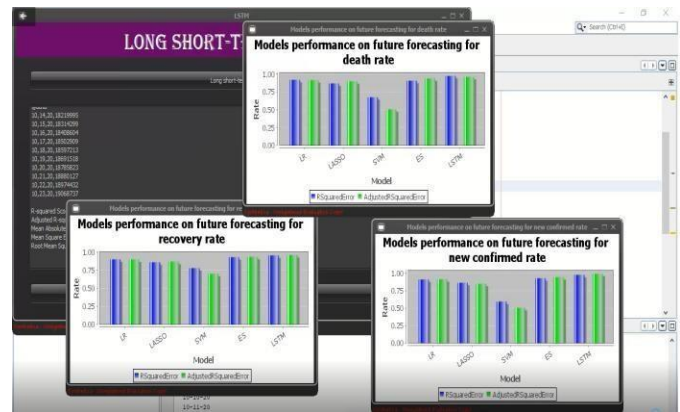
Yield setup generally implies the results and information that are delivered by the structure for some end-clients; it should be sensible with the overhauled plan. The Result of the item is used to make the far off foundation of the newprogramming in the structure and, it is cognizant the speedy mindful of the system that should be updated it as the commitment to the system. Yieldis the essential defense developing the system and the reason on which they survey the handiness ofthe application. PC yield is the vitally immediate wellspring of information to the client yield setup oversees structure plan useful yield design should work on the connecting with client. The term yield applies to any information conveyed by an information structure in regards to showed. Right when analyst plan structure yield, they Recognize the specific yield that is supposed to meet the essentials of end client. Seeing the yield reports by the client is basic because the client is a conclusive selected power

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Mobile Ad Hoc Networks

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Abstract: Mobile Ad Hoc Network (MANET) is a collection of two or more devices or nodes or terminals with wireless communications and networking capability that communicate with each other without the aid of any centralized administrator also the wireless nodes that can dynamically form a network to exchange information without using any existing fixed network infrastructure. And it's an autonomous system in which mobile hosts connected by wireless links are free to be dynamically and some time act as routers at the same time, and we discuss in this paper the distinct characteristics of traditional wired networks, including network configuration may change at any time, there is no direction or limit the movement and so on, and thus needed a new optional path Agreement (Routing Protocol) to identify nodes for these actions communicate with each other path, An ideal choice way the agreement should not only be able to find the right path, and the Ad Hoc Network must be able to adapt to changing network of this type at any time.

Keywords: wireless communications, Routing Protocol, and changing network.

1. INTRODUCTION

From last some years not only mobile devices are becoming smaller, more punk, more convenient, and more configured, they also run more applications and network services which increasing the development of mobile computing equipment market. Projections indicate that in the next couple of years the number of fluid connections and the number of consignments of mobile and Internet terminals will grow yet by another 20–50% A mobile ad hoc network (MANET) is a collection of mobile devices that can pass by each other without the use of a predefined infrastructure or centralized administration. In addition to freedom of mobility, a MANET can be constructed quickly at a low cost, as it does not rely on existing network infrastructure.Due to this flexibility, a MANET is attractive for applications such as disaster relief, emergency operations, military service, maritime communications, vehicle networks, casual meetings, campus networks, robotic networks, and so on. Unlike the conventional network, a MANET is characterized by having a dynamic, continuously changing network topology due to mobility of nodes

1.1 Ad hoc networking issues

Ad-hoc networks are a fresh paradigm of wireless communication for mobile hosts. In that respect is no set up infrastructure such as base stations for mobile switching. Nodes within each other's radio range communicate directly via wireless links while those which are far apart rely on other nodes to relay messages. Node mobility causes frequent changes in topology. The wireless nature of communication and lack of any security infrastructure raises several security

problems. The following Fig 1 shows the operating process of ad hoc network.
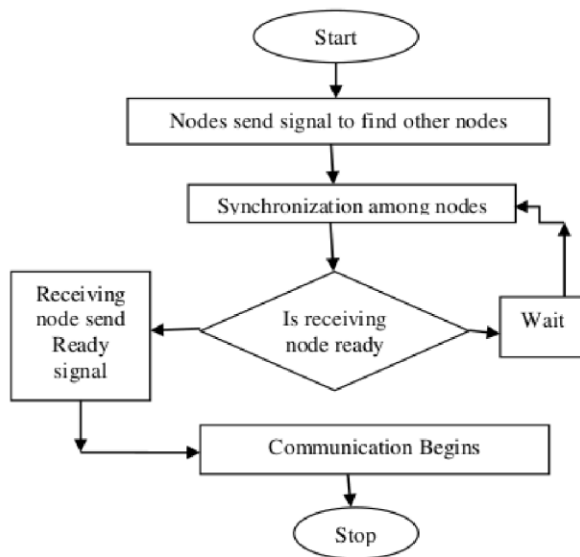
Fig 1 Working Procedure Ad hoc Networks

There are some specific MANET issues and constraints which create evils and significant challenges in the ad hoc network. To show the enormous sum of research activities on ad hoc networks in a methodical manner, we will use them, as a hint. The simplified architecture shown in following Fig 2

As depicted in the Figure, the research activities will be combined, according to a layered approach into three primary regions:

• Enabling Technologies; • Networking; • Middleware and applications.
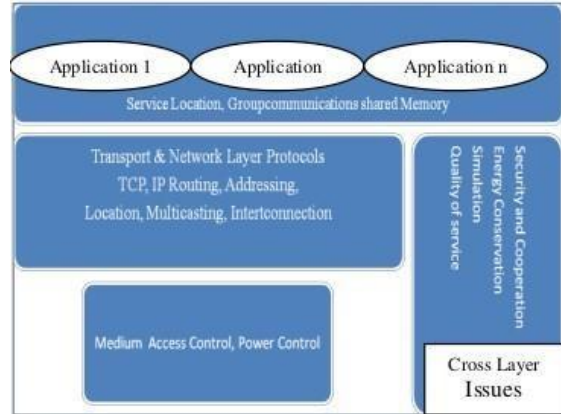
he development of MANET cannot be separated from the universe of computing. Since it is portable and compact media with which we can communicate exclusive of a wired net. In this review paper, we talked over some typical and dangerous vulnerability in the MANET, attack type security criteria, which move on to supply guidance to the security-related research works in this field.

1.2 Characteristics of MANET

Autonomous and infrastructure less: MANET is a self- organized network, independent of any established infrastructure and centralized network administration. Each node acts as a router and operates in a distributed manner. Multi-hop routing: Since there exists no dedicated outer, then every node as well acts as a router and aids in forwarding packets to the designated goal. Hence, data sharing among mobile nodes is made available. Dynamic network topology: Since MANET nodes move randomly on the net, the topology of MANET changes frequently, leading to regular route changes, network partitions, and possibly packet losses. Variation on link and node capabilities: Every participating node in an ad hoc network is equipped with a dissimilar type of radio devices having varying transmission and receiving capabilities. They all operate on multiple frequency bands. Asymmetric links may be made due to this heterogeneity in the radio capabilities. Energy-constrained operation: The processing power of node is restricted because the batteries carried by portable

mobile devices have fixed power supply. Scalability: A wide range of MANET applications may call for bulky networks with mass of nodes, especially that can found in strategic networks. Scalability is essential to the flourishing operation of the MANET

2. ROUTING PROTOCOLS

MANET routing protocols are categorized into three main categories depending upon the criteria when the source node possesses a route to the destination, as shown in the following tree structure

2.1 Proactive Routing Protocols

The proactive protocols maintain reliable and up to date routing information between all the clients in an ad hoc network. In this each node builds its own routing table which can be utilized to find out a path to a destination and routing data is stacked away. Whenever there is any variation in the mesh topology, updating has to be established in the entire network. More or less of the main table driven protocols are:Optimized Link State Routing protocol (OLSR) Destination sequenced Distance vector routing (DSDV) Wireless routing protocol (WRP)
Fish eye State Routing protocol (FSR)
Cluster Gateway switch routing protocol (CGSR)

2.2 Reactive Routing Protocols

In On-demand or Reactive routing protocols routes are formed as and when required. When a client wants to commit information to any other node, it first initiates route discovery process to find out the route to that destination node. This path remains applicable till the destination is accessible or the route is not wanted. Dissimilar types of on demand driven protocols have been developed such as:

Ad hoc On Demand Distance Vector (AODV)

Dynamic Source routing protocol (DSR)
Temporally ordered routing algorithm

(TORA) Associativity Based routing (ABR)

2.3 Hybrid Routing Protocols

This case of routing protocols combines the characteristics of both the former classes. The nodes belonging to a particular geographical region are believed to be in the same zone and are proactive in nature. Whereas the communication between nodes located in different zones is done reactively. The different types of Hybrid routing protocols are: Zone routing protocol (ZRP) Zone-based hierarchical link state (ZHLS) Distributed dynamic routing (DDR)

2.4 AODV

It is a reactive routing protocol designed for a mobile ad hoc network. In AODV , when a source node S wants to transport a data package to a destination node D and does not have a route to D, it initiates route discovery by broadcasting a route request (RREQ) to its neighbors. The immediate neighbours who receive this RREQ rebroadcast the same RREQ to their neighbours. This procedure is iterated until the RREQ reaches the goal client. Upon meeting the first arrived RREQ, the destination node sends a route reply (RREP) to the source node through the reverse path where the RREQ arrived. The same RREQ that arrives later will be brushed aside by the destination client. In addition, AODV enables intermediate nodes that have sufficiently fresh routes (with destination sequence number equal or larger than the one in the RREQ) to generate and send a RREP to the root node

2.4 OLSR

It is a proactive routing protocol, that it is founded on the periodic exchange of topology information. The central concept of OLSR is the use of multipoint relays (MPR) to supply an efficient flooding mechanism by reducing the number of transmissions required. In OLSR each node selects its own MPR from its neighbours. Each MPR node maintains the list of knowing that were picked out as an

MPR; this inclination is called as an MPR selector list. Only nodes selected MPR nodes are responsible for advertising well as sending on an MPR selector list advertised by other MPRs.

3.CASES OF ATTACKS FACED BYROUTING

PROTOCOLS Due to their underlined architecture, ad-hoc networks are more easily attacked than a cabled net. The attacks prevalent on ad-hoc routing protocols can be broadly classified into passive and active attacks A Passive Attack does not interrupt the performance of the protocol, but attempts to hear valuable data by taking heed to traffic. Passive attacks basically involve obtaining vital routing information by sniffing around the web. Such attempts are commonly difficult to detect and hence, defending against such attacks is complicated. Even if it is not possible to distinguish the precise placement of a node, one may be capable to find information about the mesh topology, using these attacks. An Active Attack, however, injects arbitrary packets and tests to disrupt the performance of the protocol in order to limit availability, gain authentication, or attract packets destined to other odes. The finish is essentially to attract all packets to the attacker for analysis or to disable the network. Such attempts can be discovered and the lymph glands can be distinguished In this report we try to examine some of the threats faced by the ad hoc network environment. 3.1 Blackhole attack

MANETs are vulnerable to several approaches. General attack types are the threats against Physical, MAC, and network layer which are the most important layers that function of the routing mechanism of the ad hoc network. In blackhole attack, the malicious node waits for the neighbours to initiate a RREQ (Request) packet. As the client receives the RREQ packet, it will forthwith transmit a false RREP (Reply) packet with a modified higher sequence

number. Thus, that the source node assumes that the client is having the fresh route towards the address. The source node ignores the RREP packet received from other nodes and begins to broadcast the information packets over malicious node. A malicious node takes all the routes towards itself. It does not allow forwarding any packet anywhere. This attack is called a blackhole as it swallows all objects; data packets
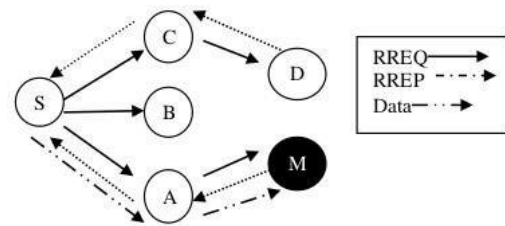
Fig 4. Blackhole Attack

In Fig 4, source node S wants to transmit data packets to a destination node D in the network. M node is a malicious node which works as a black mess. The attacker replies with a false reply RREP having higher modified.

3.2 Flooding Attack

The intention of the flooding attack is to beat the network resources, such as bandwidth and consume a node's resource, such as computational and battery power or to disrupt the routing procedure to cause severe degradation in network operation. For instance, in AODV protocol, a malicious node can broadcast a great number of RREQs in a short period to a destination node that does not exist in the mesh. Because no one will respond to the RREQs, these RREQs will flood the whole web. As a consequence, all of the node battery power, as well as network bandwidth will be eaten up and could contribute to denial-of-service. In the authors establish that a flooding attack can decrease throughput by 84 percentages. 3.3 Link Withholding Attack

In this approach, a malicious node ignores the requirement to advertise the link of specific nodes or a group of nodes, which can result

in link loss to these clients. This character of approach is especially dangerous in the OLSR protocol. 3.4 Link Spoofing Attack

In a link spoofing attack, a malicious node advertises fake links with non-neighbours to disrupt routing operations. For instance, in the OLSR protocol, an attacker can advertise a fake link with a target's two-hop neighbors. This makes the target client to select the malicious node to be its MPR. As an MPR node, a malicious node can then fake the data or routing traffic, for model, altering or dropping the routing traffic or doing other types of Denial of
Service attacks

Fig 4. Link Spoofing Attack
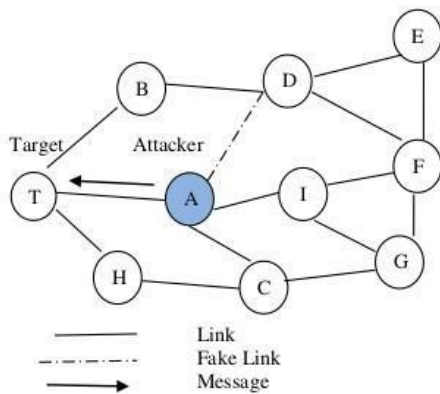
The above Fig 4 shows an example of the link spoofing attack in an OLSR MANET. In this form, we take that node A is the attacking node, and node T is the prey to be set on. Before the attack, both nodes A and B are MPRs for node T. During the link spoofing attack, node A advertises a fake link with node T's two-hop neighbor, that is, node D. According to the OLSR protocol, node T will select the malicious node A as its only MPR since node A is the minimum set that reaches node T's two-hop neighbours. By being node T's only MPR, node A can then drop or withhold the routing traffic generated by node.

3.5 Replay Attack

In a MANET, topology frequently changes due to node mobility. This means that the current network topology might not exist in the future. In a replay attack, a node records another node's valid control messages and resend them later. This causes other nodes to record their routing table with stale routes. Replay attack can be misused to impersonate a specific client or simply to disturb the routing operation in a MANET.

3.6 Wormhole attack

A Wormhole attack [12] is one of the most advanced and severe attacks in MANETs. In this attack, a pair of colluding attacker's record packets at one location and replays them at another position using a private high speed web. The sincerity of this approach is that it can be set up against all communications that offer authenticity and confidentiality. The following Fig 5 presents an example of the wormhole attack against a reactive routing protocol. In this figure, we assume that nodes A1 and A2 are two colluding attackers and that node S is the target to be attacked. During the approach, when source node S broadcasts a RREQ to find a path to a destination node D, its neighbors J and K forward the RREQ as usual. However, node A1, which received the RREQ forwarded by node J, records and tunnels the RREQ to its colluding partner A2. Then, node A2 rebroadcasts this RREQ to its neighbor P. Since this RREQ passed through a high-speed channel, this RREQ will reach node D first. Thus,node D will choose route D-P-J-S to unicast a RREP to the source node S and ignore the same RREQ that arrived later.

Fig 5. Wormhole Attack
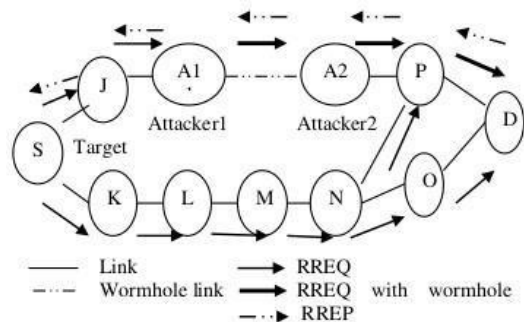
As a result, S will select route S-J-P-D that indeed passed through A1 and A2 to send its data.

3.7 Colluding Misrelay Attack

In this attack, multiple attackers work in collusion to modify or drop routing packets to disrupt routing operation in a MANET. This approach is hard to detect by using the conventional methods such as watchdog and portraiture . Fig 6 presents an example of this approach. Take the case where node A1 forwards routes packets for node T. In the figure, the first attacker A1 forwards routing packets as usual to avoid being detected by node T. Nevertheless, the second attacker A2 drops or modifies these routing packets. In the authors discuss this type of attack in OLSR protocol and show that a pair of malicious nodes can disrupt up to 100 percent of data packets in the OLSR MANET.
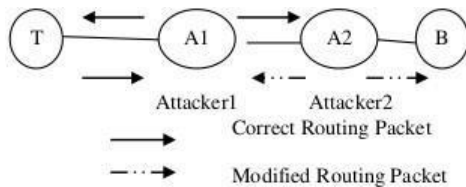
Fig 6. Colluding Misrelay Attack

Since there is no set up infrastructure in Ad hoc network, Security is a major topic. As MANETs typically lacks a fundamental authority for authentication and key distribution, security mechanisms must be scalable and capable of frequent topology changes. The trust element is an significant concept in network security, as it is the set of relations among agents participating in the network activities. Cryptography is the technique utilized to provide data communication, security, integrity, authenticity, confidentiality and non-renunciation. The cryptographic system is separated into symmetric and asymmetric cases. The Symmetric system requires less processing than asymmetric, but clients should share the secret keys by a secure channel. In MANETs, there is no any pre-established channel. Hence, Symmetric system is not suitable for MANETs. Whereas Asymmetric system

requires a trusted entity to process key authentication and credential. Cryptographic algorithms require public and private keys. The key management system is used to administrate these keys. It offers several processes like key generation, maintenance, distribution, protection, revocation of keys and ensures availability to clients. Identity-based coding is one of the key management strategies. Identity-based Cryptography is a pattern of asymmetric cryptography, which is appropriate for MANET. In this method, third party server uses a simple identifier such as email address, for generating public key. In identity-based cryptography, verification of user''s validity is achieved by its unique identifier (ID). Private Key generates from a key generation center (KGC) while the Public Key is obtained from the user's ID . It is most suited for the MANET environment. We proposed Identity based cryptography to handle attacks in MANETs.

5.CONCLUSION

The development of MANET cannot be separated fromthe universe of computing. Since it is portable and compactmedia with which we can communicate exclusive of a wired network. In this review paper, we discussed some typical and dangerous vulnerability in the MANET, attack type security criteria and proposed Identity based cryptography, which move on to guide to the security-related research works in this area.

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Network Support for AR/VR

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ABSTRACT: Augmented Reality and Virtual Reality are swiftly gaining attention and are increasingly being deployed over the network. These technologies have big industrial ability to become subsequent huge platform with a extensive range of programs. This experience will handiest be pleasant while the network infrastructure is able to support these packages. Current networks but, are nevertheless having a hard time streaming excessive exception a

videos. The advent of 5G Networks will enhance the community overall performance, however it's far uncertain it will likely be sufficient to provide new programs turning in augmented truth and virtual reality offerings. There are few surveys at the topic of augmented fact structures, and their awareness basically stays on the actual shows and capability applications. We survey the literature on AR/VR networking, and we focus here on the capacity underlying community problems.

1   INTRODUCTION

With the constant advancement of Increased Reality (AR) and Augmented Reality (VR) innovations, new challenges have been emerged in network region for sup porting these applications. Facebook and YouTube have previously sent help for some vivid recordings, including 360degree recordings. These technologies are still in their outset yet many trust they can possibly shape the following experience for diversion, schooling and trade. While the absolute first business organizations, for example, Google Glass for expanded reality, were not so fruitful as trusted, new items available continue to attempt to convey an improved encounter to clients.This experience might be fulfilling when the network framework will actually want to help these applications. Current organizations be that

There are few studies on the subject of expanded reality frameworks (say, (Van Krevelenand Poelman,2010)), and their attention for the most part remains on the genuine dis plays and likely applications. (Westphal, 2017)recorded a difficulties for the organization to helpAR/VR and proposed Data Driven Organizationas an engineering reply. Wecentre here around the potential hidden network issues. We present someof these issues in this overview.We endeavour to review the writing to perceive how tobetter convey a vivid involvement with the organizationlayer. There are various strings in this

work. Onecentral point of contention to effectively convey a fantastic vividexperience is to convey what the client is seeing withsuperior grade. Specifically, the viewport of the client ought tobe dependably given in high goal. In any case, delivering each conceivable view at top notch forces a restrictive expense in data transfer capacity. One response is to as it were convey the perspectives that are really seen at top Quality goal. In any case, delivering each conceivable view at top notch forces arestrictive expense in data transfer capacity. One response is to as it were convey the perspectives that are really seen at top high Quality.We endeavour to study the writing toperceive how tobetter convey a vivid involvement with the organizationlayer. There are various strings in this work. Onemain point of interest to proficiently convey a fantastic vividexperience is to convey what the client is seeing withtop Quality. To be specific, the viewport of the client ought tobe dependably given in high goal. Nonetheless, delivering each conceivable view at excellent forces arestrictive expense in data transmission. One response is to as it wereconvey the perspectives that are really seen at superior grade

In Segment 2, we consider what should be possible to predict the movement of the client's view, to convey as it werethe negligible measure of information that envelops what the client will be checking in the vivid stream out.In Segment 3, we check out at the pressure and codingplans to lessen the data transfer capacity impression of the application.In Segment 4, we concentrate on the best way to convey an application stream that is viewport subordinate. Segment 5 con siders the potential storing systems at the organizationlayer to improve vivid applications. Area6records a portion of the experimental outcomes and the datasets thatcan be utilized for testing new upgrades. At long last,Area 7 offers a few finishing up comments.

2 PREDICTION OF THE USER'S FIELD OF VIEW

360degree films (Sometimes refers as omnidirectional videos), additionally called immersive motion pictures or round films, are video recordings where a view in each path is recorded on the equal time, shot the use of an omnidirectional digicam or a group of cameras. During playback on normal flat show the viewer has manage of the viewing course like a landscape. It can also be performed on a shows or projectors arrangedin a cylinder or a few a part of a sphere. Every day, those motion pictures are becoming increasingly ubiquitous due to the dramatic boom in the reputation of the Internet offerings together with social networking, e-trade web sites, e-mastering websites and so forth. Determining the particular person's characteristics from its video circulation is essential to keep bandwidth and enhance the QoE for the users. As displayed in figure 1, 360 degreevideosuse the position sensors to detect viewing statistics from the HMD. This permits the consumer to continually replace a scene according to the top movement, rotation, and so forth. Prefetching strategies have to carefully stability contrasting targets, particularly maximizing satisfactory and fending off stalls in the played circulation and

prefetch new content material from one-of-a-kind channels to provide a continuing switch.

Zhang Hui (Zhang and Chen, 2016) predicts user provider get right of entry to records (which includes incidence time, incidence region, service kind and provider content) in the subsequent period by studying the user's behaviour. They formulate a modified entropy weighted Markov version to correctly predict the consumer's provider states with an adaptive comments based totally weight correction approach. Andrew Kiruluta(Kiruluta et al., 1997) uses a Kalman filtering model to predict head movements. The key idea is to apprehend that head movement trajectories may be assumed to be restricted on piecewise steady acceleration paths with an additional noise componentto account for any perturbationfrom these paths. (Vintan et al., 2006) proposes neural prediction strategies to anticipate a person's subsequent movement. They recognition on neural predictors (multi-layer perceptron with returned-propagation mastering)

with and without pre-schooling. Mavlankar and Girod (Mavlankar and Girod, 2010) carry out fixation prediction in videos the use of features like thumbnails, motion vectors, and navigation trajectories. With the advanced system gaining knowledge of technologies, varioussupervised learning methods such as neural networks are adopted for higher feature extraction and prediction accuracy in fixation detection (Alshawi et al., 2016), (Chaabouni et al., 2016), (Nguyen et al., 2013). Chaabount et al. (Chaabouni et al., 2016) build a convolutional neural networks (CNN) structure and use residual movement because the capabilities for predicting saliency in motion pictures. Alshawi et al. (Alshawi et al., 2016) have a look at the correlation among the attention-fixation maps and the spatial/temporal buddies, which affords any other way to quantify viewer attention on movies. Nguyen et al. (Nguyen et al., 2013) suggest to adopt the statistics of static saliency (in pictures) after which

3VIEWPORT-SUBORDINATE STREAMING

Computer generated Reality gadgets are rapidly becoming accessible to an enormous public. It is, accordingly, anticipated thatthe interest for 360 degree vivid recordings willfill reliably before very long. In VR streaming, the client is submerged in a virtual climatewhat's more, can progressively and openly choose the likedseeing position, called viewport. Tragically, VRstreaming is much of the time impacted by inferior quality these days,because of the great transmission capacity necessities of 360 degree recordings. Viewport-subordinate arrangements have often been proposed for VR streaming, as they are capableto lessen the data transfer capacity expected to stream the VRvideo. Viewport-versatile streaming has as of late received a

developing consideration from both scholar andmodern networks.

Starter results show that viewport-versatile streaming strategies are compelling under short reactiondelay as it were. In particular, for viewport versatile methods to beat Equivalent when the edge rateis 30fps, the cradle sizes in instances of the adaptation time periods, 32, and 64 casings ought to be under 1s, 0.5s, and 0.125s, individually. When the cushion size surpasses 2s, Equivalent, which is a viewport-autonomous technique, outflanks all considered viewport-versatile strategies. Along these lines, viewport versatile streaming is by all accounts insufficient when using existing HTTP Streaming arrangements due to longreaction delay. Heetal (He et al., 2018) took a gander at the joint adaptation of the field of view with the rate under variations of the organization delay and the clog. They proposed a calculation to adjust the size of the field of view to be downloaded in light of the organization and buffering deferral to recover and see the stream portion t so it envelops with high probability the client's viewport at the hour of delivering.

4 IN-NETWORK CACHING

By and large, the Web has advanced in an ad hoc way where gradual patches were added

to deal with new necessities as they emerged. This implies that the basic organization model has notchanged over the course of the past many years, while the administrations using the Web did so definitely. Data Centric Systems administration (ICN) is anorganization engineering that develops from the conventional host-situated communication model to a substance driven model, which can be very advantageous in versatile streaming (West phal (Supervisor) et al, 2016). Especially,

ICN dependson the spot autonomous naming plans, in-network inescapable reserving, and content-based directing to al low an effective circulation of content over the network. Additionally, ICN hubs can consistently utilize all the accessible organization connection points to recover content. Content Driven Systems administration (CCN) and Named Information Organizing (NDN) are run of the mill launches of the ICN worldview. (Zhang et al., 2017) proposed a VR video conferencing framework over named information organizations (NDN). (Westphal, 2017) presented the defence that ICN could respond to a portion of the issues of AR/VR networking support. In any case, other storing arrangements may help also. Edge registering is supposed to be a successful solution to convey 360 degree computer generated reality recordings over networks. Reserve is one of fundamental assets for empowering these applications. Mangiante et al. (Mangiante et al., 2017) present a Field Of View delivering arrangement at the edge of a portable organization, intended toenhance the transmission capacity and inactivity expected by VR 360 degree video web based. Jacob Chakareski et al.(Chakareski, 2017) planned a streamlining frame work that permits the base stations to choose cooperative storing/delivering/streaming systems that maximize the total award they procure while serving the clients, given explicit storing and computational assets at each base station. Zhang Liyangetal. In (Matsuzono et al., 2017), they propose a low dormancy, low misfortune streaming instrument, L4C2, advantageous for excellent ongoing deferral delicate streaming. L4C2 is likewise worked with in-network storing system.

5 NETWORK ARCHITECTURE

From the above discussion, it is clear that current AR/VR applications are requiring network resource that are difficult to meet. Therefore, the network infrastructure needs to be reevaluatedin order to support such apps. [10] looked at the impact of network topology on the performance of scalable multi-user virtual environments. Peerto-peer flat topologies, and client-server hierarchicaltopologies are considered. NetEffect [8] is a specific embodiment of a virtual environment which is partitioned into different communities, each one of which is allocated to a specific server. The client visiting the corresponding part of the VE is migrated to the proper server. Mobile Edge Computing (MEC) [15] presents a network architecture for 5G which supports virtual reality. There has been some work on video distribution using edge computing [12] [25]. The MEC server holds AR data and AR object caches for high bandwidth/low latency content delivery.

A. Functions and APIs

While it is possible that AR/VR will happen purely as an overlay play, we contend that properly placed functions and properly defined APIs will alleviate the potential networking issues. Virtual reality needs to transmit a representation of a VE. One potential way is to transmit the whole representation, and let the device select which specific view to display. However, this is an inefficient way to use the network, as most of therepresentation is never observed and it is not necessary to transmit it. In the specific sub-case of 360 video, [19] looked at ways to minimize the amount of transmitted data. It does it through two mechanisms: one is a representation of the VE that can be packetized into views, such that only the required views need to be transmitted. The other is a prediction mechanism of what

direction the user will be looking at, what her position will be, and using this prediction, only the predicted views are transmitted (plus some buffer around it to correct for prediction errors), or only the predicted landscape is pre-processed. Integrating AR/VR with the network infrastructure would require to open up APIs towards these two functions (namely an encoding mechanism and a prediction mechanism) such as to minimize the bandwidth. Integrating pre-processing of augmented reality in the infrastructure (for instance, at the access point serving the user) would go a great way towards solving the RTT issues. It is unclear that an OTT player could reach this level of server placement.

B.Information-CentricNetwork   Architecture
We now flip our interest to the capacity benefits that Information-Centric Networks can carry to the belief of AR/VR. The abstractions offered by using an ICN architecture are promising for video shipping [5] [13] [25]. RFC7933 [22] as an instance highlights the demanding situations and potential of ICN for adaptive price streaming. As VR particularly may encompass a video thing, it is natural to do not forget ICN for AR/VR. There is a lot of existing paintings on ICN (say, caching [23] [24] or traffic engineering [3] [20] [7]) which can be implemented to fulfill the QoS necessities of the AR/VR applications, when feasible. One of the important thing benefits from ICN is the local aid for multicast. For example, [16] costs: "if the systems are to be geographically dispersed, then highspeed, multicast verbal exchange is needed." Similarly, [9] states that:"Scalability is executed via making sizeable use of multicast strategies and with the aid of partitioning the virtual universe into smaller regions." In the game use case, many users could be taking part within the equal scene. They can have doubtlessly distinct

factor of perspectives, as every might also look at one specific direction. However, each of those views may percentage some overlap with the others, as there is a natural focus factor inside the occasion (say, the ball in a basketball sport). This manner that a number of the users will request a few commonplace statistics and native multicast significantly reduces the bandwidth and within the case of ICN, without more signalling. Further, the multicast tree should be adhoc, and dynamic to efficiently support AR/VR. Back in 1995, [11] tried to discover the visual interactions in among entities representing users in a VE with a view to "reduce the variety of messages required to preserve constant nation among many workstations disbursed across a extensive-area community. When an entity

modifications state, replace messages are despatched handiest to workstations with entities that can potentially perceive the exchange i.e., ones to which the replace is seen." [11] become able to reduce the quantity of messages processed by using purchaser workstations via a issue of forty. It is uncertain that ICN can help in figuring out which workstations (or these days, which users) can also understand the repute replace of every other person (however naming the information at the community layer can also assist). Nonetheless, the multicast tree to attain the set of customers that could require an update is dynamically modified and the help for multicast in ICN definitely supports this dynamic behaviour. The caching function of ICN lets in prefetching of statistics near the threshold a number of the extra static use cases; similarly, in the case of a couple of customers sharing a VE, the caching permits to perform the content material placement phase for a few users on the identical time as the content material distribution segment of

others, thereby lowering bandwidth consumption.

6 RESEARCH CHALLENGES

Some studies challenges are therefore: • to discover the community architecture which could shipping AR/VR functionality in 5G networks; in particular, which capabilities are essential, and a way to combine this capabilities inside the network structure; to become aware of the interfaces required from AR/VR to the community; especially, can AR/VR characteristic only as overly, or must AR/VR require some help from the infrastructure for caching, multicasting, traffic engineering, QoS, and so forth. to discover the right naming semantics to show at the network layer enough information to permit the sharing of facts in between numerous VE classes; to perceive the coding of the VE so that a VE may be packetized into multiple view "cells" units that may be recomposed into a VE sessions, and that may be shared in betweenspecific classes;to signify the motion prediction and the corresponding network protocol; to evaluate whether this facts needs to be shared with the infrastructure; to pick out price adaption mechanism for AR/VR, just like the charge adaptive mechanisms in video distribution; to discover caching policies for AR/VR content material; to specify QoS at the fly, using SDN or similar manage equipment; to specify what an SDN controller needs to realize approximately an AR/VR utility.

7 CONCLUDING REMARKS

AR/VR push the limits of the organization ability. The upcoming 5G carry out won't lighten the issues in generalfurthermore, hence these applications need both in-network support as well as upgrades at the application layer to be effectively conveyed. Thus, it is a exceptionallydynamic area of exploration. We endeavoured to portray this exploration scene in this record.We have perceived how client's movement forecast could help with decreasing the data transmission; how coding andpressure plans are being created; how tiling furthermore, FoV can be adjusted to the organization conditions;how reserving will help with the sending of such applications; and what datasets are as of now accessibleto specialists who might want to test new strategies and calculations. Future exploration bearings ought to incorporate strategiesto further develop execution in three bearings: data transfer capacity utilization ought to be limited by further developing expectation of the client's behaviour, further developed pressure plans, sharing and multicasting utilizing proficient tiling, and so forth.defer responsiveness of the organization ought to be improved; 5G will altogether lessen the network RTT, yet diminishing the portion length (along with the related coded plans), carrying the servers to the edge, giving QoS for vivid application, working on the equipment, and so forth, are undeniably required.diminishing the computational effect on the net work; to help transcoding, or processing of the AR/VR uplink streams (for sensor and position information and for picture and example recognition), the figuring at the edge will essentially increment. Strategies to limit this effect, methods for better example acknowledgment and for sharing this handling among clients, and so forth, actually should beformulated.

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PREDICTION OF ELIGIBILITY TO ADMIT IN UNIVERSITIES USING MACHINE LEARNING ALGORITHM

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Abstract - This project University Admit Eligibility Predictor is web based application in which students can register with their personal as well as mark details for prediction the admission in colleges and the administrator can allot the seats for the students. In the present schooling world there are numerous quantities of understudies who need to seek after Higher training in the wake of Engineering or any Graduate certification course. In the modern world of technology, computer are affecting our lives in more ways than we probably are aware of computerized management maintaining information of an educational institute, colleges, other the list is endless. The main principle behind the need of college admission system is easy supervision of institutes. This helps the student not only to help in filling out the application forms but also give the students an idea about their future college by calculating their cut off. Using this Application, the entrance seat allotment becomes easier and efficient. The main advantage of the project is the computerization of the entrance seat allotment process. Administrator has the power for the allotment. Admin can add the allotted seats into a file and the details are saved into the system. The total time for the entrance allotment becomes lower and the allotment process becomes faster. It helps students to make right decisions for choosing their college.
Keywords: Linear regression, Admission prediction Machine learning.

I. INTRODUCTION

Today all the work at the time of admission of the students is done manually by ink and paper, which is very slow and consuming much efforts and time. In the modern world of technology, computer are affecting our lives in more ways than we probably are aware of computerized management maintaining information of an educational institute, colleges, other the list is endless. The main principle behind the need of college admission system is easy supervision of institutes. It can handle the details of students such as fee details or marks details. This Student Database has been designed taking into account the practical needs to manage a Students data. Moreover, it provides security at product level as well as user level. Its design concentrates on 3 types of users:

    1. Admin
    2. Students
    3. Account
    4. Student section

This Database follows a typical event flow seen in such a system. The design and implementation of a comprehensive student information system and user interface is to replace the current paper records. This system is intended for communication purpose

between users of academic institutions. This system helps the administrator to easy access the information of students. This

system is also helpful for the administrator because he/she can easily bring changes to the records of the students. The mobile application would require connecting to the database on a remote server using Wi-Fi technology. Our system primarily focuses on building an efficient and user friendly Android mobile application for a Cloud based Intra-College Communication Information System using Mobile Clients. The application will be installed on the users (student/teachers) Smartphone. Here the concept of unique ID is also included using which the each student gets one unique identification number by email. This id will help to access his info or find him from multiple students.After XII, students desiring to take admissions in professional colleges like engineering face lots of problems. Admissions in engineering colleges in the state of Maharashtra or any state is based upon common entrance test (CET) and since more than 1.5lakh seats are to be allotted in more than 200 engineering colleges and over 35 different branches of engineering , for students belonging to many categories like open, home university, outside home university, reserved category the problem becomes more serious and students struggle to understand which colleges they are likely to get admitted in, even after going through cut-off data of previous years. Many students fill wrong Options and fail to get admission. To minimize the stress of students we came up with the idea of a computer aided method which will help the students get the list of all colleges in which they could get the admission at the click of a button, making the admission process fast and easy.

A. Objective

College admission predictor is a boon to many students. This helps the student not only to help in filling out the application forms but also give the students an idea about their future college by calculating their cut off.

•   When students come from rural places , they find it hard to go along with the formal procedures. So, this application helps them a lot and eases out their fear.

•   Whatever may be their scores , this application helps to find the best colleges . Hence, our proposed computer aided system will help the students to get the list of all colleges in which they could get the admission at the click of a button.

•   The students only have to enter their marks of XII. With this application, the students can very easily obtain the list of colleges even branch wise and course wise. This

will not only make the admission process easy but also minimizes stress for students .The main objective of our system is to make the right choice of colleges.

2. EXISTING SYSTEM

Today in college's student details are entered manually .The student details in separate records are tedious task .Referring to all these records updating is needed .There is a chance for more manual errors.

1.When the student comes in college.

2.First of all ,he/she takes admission form from reception.

3.Fills it and submits it into office.

4.Filled form is first checked with documents like merit list an details came from university and verified by an official person ,if there is any mistake then it is corrected.

5.At the time of submission of it the fees is deposited by the candidate .

6.At the time of submission of admission form admission number is assigned to the candidate by the institute.

7.Candidate gets the receipt of fees deposition.

A.DISADVANTAGES OF EXISTING SYSTEM

1. Require much man power i.e. much efforts, much cost and hard to operate and maintain.

2. Since, all the work is done in papers so it is very hard to locate a particular student record when it is required.

3.PROPOSED SYSTEM

The main goal of the system is to automate the process carried out in the organization with improved performance and realize the vision of paperless admission. Some of the goals of the system are listed below:

•Manage large number of student details.

•Manage all details of student who registered for the course.

•Create student accounts and maintain the data is effectively.

•View all the details of the students.

•Reduce the work load in interview the students for selection.

•Activities like updating, modification, deletion of records should be easier.

A.ADVANTAGES OF PROPOSED SYTEM

The aim of the proposed system is to address the limitations of the current system. The requirements for the system have been gathered from the defects recorded in the past and also based on the feedback from users of previous metrics tools. Following are the objectives of the proposed system:

• Reach to geographically scattered student : One of the important objectives of the admission system is communicate with all the students scattered geographically.

• Reducing time in activities: Reduce the time taken process the applications of students ,admitting a student, conducting the online examination, verify student marks, and send call letters to selected students.

• Centralized data handling :Transfer the data smoothly to all the departments involved and handle the data centralized way.

• Paperless admission with reduced man power : Cost cutting. Reduce the cost involved in the admission process.

System flow

4. SYSTEM DESIGN

The system comprises of 2 major modules with their sub modules as follows: • Admin:

✓ Add College: Provide details for college like name, address, streams provided etc.

✓ Add Cut Off: Select College from database and provide cut off for previous years.

✓ Manage / View Colleges: Update details for college and delete them if require.

✓ View Students: View list of students registered into the system.

✓ View Feedback: View feedback sent by user (student).

• Student:

✓ Register: Student will register themselves to the system by providing name, email ID, marks etc.

✓ View College: Student will be provided an option to show colleges near him and will show all the colleges based on his score.

✓ View Profile: Can view their own profile details.

✓ Feedback: Student can send the feedback to notify the admin about the system.
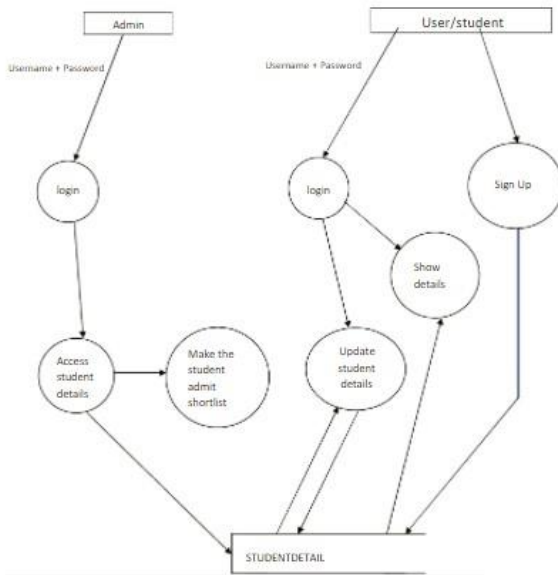
System Architecture

The system design develops the architectural detail required to build a system. As in the case of any systematic approach, this software has undergone the best possible design phase fine tuning all efficiency, performance and accuracy levels.

6.DESIGN METHODOLOGY

Multiple machine learning algorithms were used for this research, K- Nearest Neighbor and Multivariate Logistic Regression algorithms were used to predict the likelihood of the students getting admission into university based on their profile. Decision Tree algorithm was used to predict the rank of the college that would be suitable for the students based on their profile and suggest the list of universities accordingly.

A.K-Nearest Neighbors

It is an algorithm which is used widely for classification and regression problems. Due to its simplicity and effectiveness, it is easy to implement and understand. It is a supervised machine learning algorithm that uses available data to create the model and further that model can be applied to classify the new data. The class of new data is determined by the class of its neighbors. Distance is calculated between the unseen data sample and the all other data samples already present in the data-set. Depending on the value of K, that many nearest neighbors are selected and their class is identified. The class of neighbors which has majority is assigned to the class of the new data sample. Generally, Euclidean distance is used to calculate the distance between the records. Multiple values of K should be tried and tested, and the value of K at which best performance is observed must be selected for the model.

B. Logistic Regression

Logistic regression algorithm is used to identify the probability of occurrence of an event based on single predictor variable. Multivariate Logistic regression can be used to determine the probability of the occurrence of an event based on multiple predictor variables. The class variable that has to be predicted has to be binary or dichotomous. Logistic Regression is also a supervised machine learning algorithm which used data with predetermined classes to create a model and perform predictive analysis on unseen data.

C. Decision Tree

It is a supervised machine learning algorithm. Due to its simple logic, effectiveness and interoperability it the most widely used classification algorithm. The model works by creating a tree-like structure by dividing the data-set into several smaller subsets based on different conditional logic. The main components of the decision tree are the decision nodes, leaf nodes and the branches. Nodes with multiple branches are the decision nodes, nodes with no branches are called the leaf nodes, and the top node is called the root node of the decision tree. The nodes are connected to each other via branches based which are different conditions. The root and decision nodes are created by computing the entropy and information gain for the data-set.

7.EVALUATION

K-nearest neighbor and Multivariate logistic regression algorithms were used to create a model that can be used to predict the likelihood of success of a students application to the university based on his/her profile. Both algorithms were tested and their performance was evaluated based on different factors like Accuracy, Sensitivity, Specificity and Kappa value. As can be seen the figure given below model created using KNearest Neighbor outperformed the model created using Logistic Regression on all the performance measures. Also by looking at the variance in the values of the data KNN seemed to be the best-fit algorithm to create the Student Admission Predictor System.
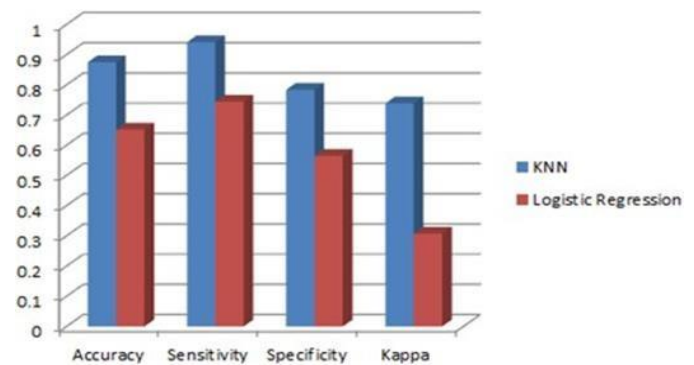
Accuracy was considered to be main metric to evaluate the performance of the models, as the data used for creating the models was balanced. Also, prediction of the true positive and true negative scenarios was equally equivalent. The KNN model performed well with an overall average

accuracy of 76%. The decision tree model which was created to predict the rank of the universities suitable for the student provided the result with an accuracy of 80%.

The main objective of this research was to develop a prototype of the system that can be used by the students aspiring to pursue their education in the abroad. Multiple machine learning algorithms were developed and used for this research. KNN proved to best-fit for development of the system when compared with the Logistic regression model. The model can be used by the students for evaluating their chances of getting shortlisted in a particular university with an average accuracy of 75%. Decision Tree algorithm was used to predict the universities which were best suitable for a student based on their profile. The decision tree algorithm proved to be 80% accurate. A simple user interface was developed to make the application interactive and easy to use for the users from the non-technical background. The overall objective of the research was achieved successfully as the system allow the students to save the extra amount of time and money that they would spend on education consultants and application fees for the universities where they have fewer chances of securing admission. Also, it will help the students to make better and faster decision regarding application to the universities.

8.IMPLEMENTATION PLANS

The major activities in implementation plan are cost estimation, schedule and milestone determination, project staffing, quality control plans, and controlling and monitoring plans The implementation plan involves the following:
Testing to confirm effectiveness.
Detection and correction of errors:
The system has two modules. They are
  1.User Administrator Students logging is to apply for the course by filling an application form provided by online.
  2.College principal/administrator logging in may also access/search information put up by the students.

9. TESTING OBJECTIVES

There are several rules that can serve as testing objectives. They are:
  Testing is process of executing a program and finding a bug. A good test case is one that has a high probability of finding an undiscovered.
  A successful test is one that uncovers an undiscovered error. If testing is conducted successfully according to the objectives as stated above ,it would uncover errors in the software. Also testing demonstrates that software functions appear to the working according to the specification, that performance requirements appear to have been met.

A.UNIT TESTING

Unit testing is carried out screen-wise, each screen being identified as an object. Attention is diverted to individual modules, independently to one another to locate errors. This has enabled the detection of errors in coding and logic. This is the first level of testing. In this, codes are written such that from one module ,we can move onto the next module according to the choice we enter.

B. SYSTEM TESTING

In this, the entire system was tested as a whole with all forms, code, modules and class modules .System testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently before live operation commences. It is a series of different tests that verifies that all system elements have been properly integrated and perform allocated functions. System testing makes logical assumptions that if all parts of the system are correct, the goal will be successfully achieved. Testing is the process of executing the program with the intent of finding errors. Testing cannot show the absence of defects, it can only show that software errors are present.

C. INTEGRATION TESTING

This testing strategies combines all the modules involved in the system. After the independent modules are tested, dependent modules that use the independent modules are tested. This sequence of testing layers of dependent modules continues until the entire system is constructed .Though each module individually, they should work after linking them together. Data may be lost across interface and one module can have adverse effect on another. Subroutines ,after linking, may not do the desired function expected by the main routine. Integration testing is a systematic technique for constructing program structure while at the same time ,conducting test to uncover errors associated with the interface. In the testing the programs are constructed and tested in the small segments.

D. WHITEBOX TESTING

White-box testing is concerned with testing the implementation of the program .The intent of this testing is not to exercise all the different input or output conditions but to exercise the different programming structures and data structures used in the program. White box testing is also called structural testing .To test the structure of a program, structural testing aims to achieve test cases that will force the desired coverage of different structures. Various criteria have been proposed for this there are three different approaches to structural testing: control flow-based testing data flow-based testing, and mutation testing.

E. BLACKBOXTESTING

In black-box testing the structure of the program is not considered. Test cases are decided solely on the basis of the requirements or specifications of the program or module ,and the internals of the module or the program are not considered for selection of test cases .In black-box testing, the tester only knows the inputs that can be given to the system and what output the system should give. This form of testing is also called functional or behavioral testing .The most obvious functional testing procedure is exhaustive testing. One criterion for generating test cases is to generate them randomly. There are no formal rules for designing test cases for functional testing. In fact, there are no precise criteria for selecting test cases.

10. FUTURE SCOPE

The future scope of this project is very broad.
Few of them are:
• This can be implemented in less time for proper admission process.
• This can be accessed anytime anywhere, since it is a web application provided only an internet connection.
• The user had not need to travel a long distance for the admission and his/her time is also saved as a result of this automated system.

11 . CONCLUSION

This system, being the first we have created in PHP, has proven more difficult than originally imagined. While it may sound simple to fill out a few forms and process the information, much more is involved in the selection of applicants than this. Every time progress was made and features were added, ideas for additional features or methods to improve the usability of the system made themselves apparent. Furthermore, adding one feature meant that another required feature was now possible, and balancing completing these required features with the ideas for improvement as well as remembering everything that had to be done was a project in itself. Debugging can sometimes be a relatively straight forward process, or rather finding out what you must debug can be. Since so many parts of the admissions system are integrated in to one another, if an error occurs on one page, it may be a display error, for example; it may be the information is not correctly read from the database; or even that the information is not correctly stored in the database initially, and all three must be checked on each occasion. This slows down the process and can be frustrating if the apparent cause of a problems not obvious at first .Language used must be simple and easy to understand and compatibility is paramount. If this system were not designed as an entirely web based application, it would not have been possible to recreate its current state of portability .Overall, the system performs well, and while it does not include all of the features that may have been desired, it lives up to initial expectations. The majority of features that are included work flawlessly and the errors that do exist are minor or graphical.

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REAL-TIME PEOPLE COUNTER AND TRACKING WITH ALERT AND TIMER SYSTEM

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Abstract— Reliable people counting and people detection is an important problem in visual surveillance. In recent years, this field has seen many advances, but the solutions have limitations: people must move, the background must be simple, and the image resolution must be high. • In this project we designed a counter and real time people tracking system. Real-time people counting is mainly achieved by two steps, head detection and tracking of detected heads for an accurate count. Our system has 2 main functions. • Detection: During the detection phase, we run our object tracker 1) find out if new objects have entered our view, and 2) see if we can find objects that were "lost" during the tracking phase. • The existing system is not executed in real-time and also the existing system has low accuracy and low efficiency in terms of load time and implementation time. Also, the existing system is implemented only with counting people. • The proposed system is done in real-time and also the accuracy is high in the proposed system. The proposed system's loading speed and execution speed is really high compared to the existing system. The proposed system is highly efficient and scalable and also further enhanced for complex use cases. • The primary goal is to use it from a business perspective, ready to scale. Real-time use cases count the number of people in shops/buildings/malls etc. • Our proposed system can also send alerts to staff if people exceed the limit. Our proposed system has automatic features and optimizes the stream in real-time for better performance (with threads).

I. INTRODUCTION

Crowd analysis becomes one of the major research topics and gained attention of researcher due to its diverse applications such as security control at public places, suspicious activities monitoring in restricted areas, crowd estimation in public rally, abnormal events detection and people tracking in emergency situations Crowd analysis has been categorized to two main parts i.e., people counting and tracking. In case of people counting, people detection and their behavior analysis isconsidered as preliminary part of all the areas of modern intelligent crowd analysis systems. While, in people tracking people are tracked in consecutive frames with respect to theirposition. Huge amount of work has been done in above fieldsbut the problem remains open due to challenges includes occlusion of people, dynamic and complex backgrounds, and variance in appearance of person moving / non-moving objects detection human verification and multi person tracking

In recent years, great efforts have been made for counting people in natural scenes.

They find out the people as dots and acts as binary masks. Then, they track the people between consecutive frames using correlation-based algorithm.

In this research work, we proposed a new hybrid approach for people detection and people tracking in surveillance videos using gaussian filter. Five main steps have been followed that include preprocessing, object detection, human verification, people counting and body tracking. Multiple types of filtering are used in preprocessing phase to remove noise and differentiate between foreground and background objects. In object detection, background has been removed and only foreground objects are detected which act as regions of interest. While, people verification is done using skin and body parts detection algorithms. Finally, people are counted based on extraction of moving objects and each people is tracked using jacquard similarity matrices.

The major contributions of this work are:

(1) People verification using hybrid approach

In people verification, we have applied hybrid approach of skin detection and body parts detection to intensify accuracy level and reduce error rate.

During skin detection, mask of original image has been created and applied on object detected to convert them into RGB image. This RGB image is further converted to YCBCR domain and pixel values are used to detect skin pixels in each object. For body part detection; head, hands and feet of each silhouette are extracted, distance between these parts are identified and used to verify object as human.

(2) People counting and tracking module

People counting have been implemented using centroid of each silhouette that is extracted at each frame and moving objects are identified among consecutive frames. In body tracking, centroid and jacquard similarity are used to track people's movements between frames.

II.   SYSTEM METHODOLOGY

The proposed system consists of five main modules; preprocessing, object detection, human verification, people counting and people tracking. Initially, preprocessing phase includes multiple filtering method as well as thresholding to remove background area and extract foreground objects. Then, objects of interest are detected and people verification is performed using hybrid approach. This approach covers skin detection and centroid based body parts detection. After human verification, people counting are done and people are tracked using object centroid and jacquard similarity index. People counting and tracking is performed for every frame for multiple sequence of data. Overview of system methodology is presented in Fig. 1.
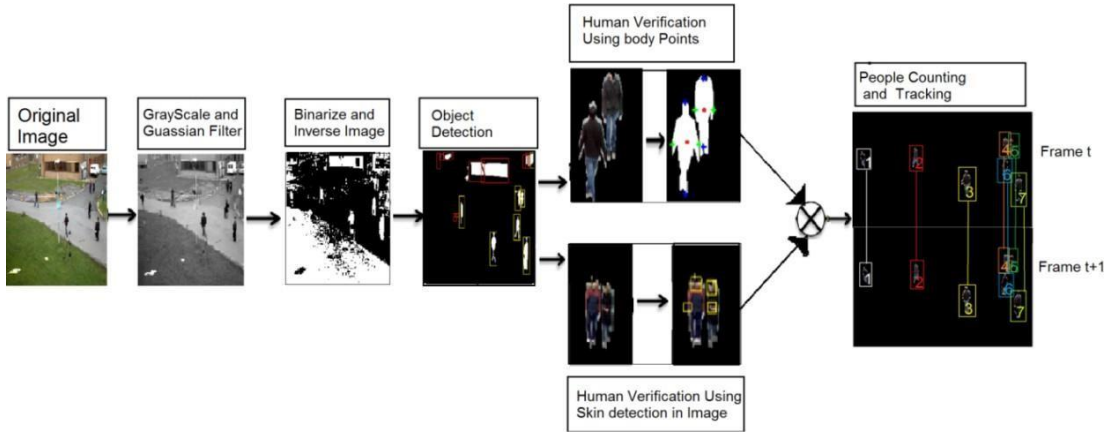

Fig. 1.   System architecture of proposed people counting and tracking modules

A. Preprocessing

Sequences of colored frames extracted from monocular cameras are used as input images. While, each frame is converted to gray scale to reduce number of channels [27-29] as shown in Algorithm 1. Different scales are assigned to red, green and blue channels for conversion to gray scale image as shown in eq. (1).

$$I_{gray} = ((a * R) + (b * G) + (c * B)) \tag{1}$$

Where *R, G* and *B* are red, green and blue channels of colored stream image and *a, b* and *c* are scales assigned to these channels, respectively. After gray scale conversion, Gaussian filter [30, 31] with standard deviation is applied to smooth the gray scale image as mentioned in eq. (2).

$$G(x, y) = \frac{1}{2\pi\sigma^2}\, e^{\frac{x^2 + y^2}{2\sigma^2}} \tag{2}$$

Algorithm 1: Preprocessing

Input: Colored Frame of Image
Output: Preprocessed Image with Region of Interest
n: total number of frames
f: current frame
for k ⟵ 1:n do
     f ⟵ ReadImage(k)
     g_r ⟵ getGrayScale(f)
     g ⟵ gaussianFilter(g_r)
     B ⟵ BinarizeImage (g)
     h ⟵ getInverse(B)
     BW ⟵ getBorderClear (h)
     L ⟵ getConnectedRegion
          for(m ⟵ 1:L) **do**
               if (numberPixel (m)> 350)
                   Fimage ⟵ Member (m)
               endif
          endfor
     Bi ⟵ FillHoles(Fimage)
     C ⟵ Eriosion (Bi)

     I ⟵ Dilation (C)
     FinalImage ⟵ I
     Return FinalImage
End for

The next step performed after smoothing the gray scale is the binarization that converted the gray scale image to binary image. Binarization *f(x,y)* is performed using fixed threshold value [32] as depicted in eq. (3).

$$f(x, y) = \left\{ \begin{array}{l} 1\ \mathrm{i}f(G(x,\ y) \geq t) \\ 0\ \mathrm{i}f(G(x,\ y) < t) \end{array} \right\} \tag{3}$$

Where *t* is value of threshold and *G(x,y)* is Gaussian filtered. These binary images are filtered to remove small components that are considered as noise. Pixel based area filtering with threshold and convolution mask are applied to remove small components from images. After noise filtering, clear border method is used to remove background area. Therefore, inverse transform using eq. (4) is applied on filtered image to reduce region of interest and then connected regions are extracted to finalize object detection.

$$(x, y) = 255 - f(x, y) \tag{4}$$

Where (x, y) is inversed image and $f(x, y)$ is binary image. Fig. 2 presents silhouettes extraction from different sublevels.
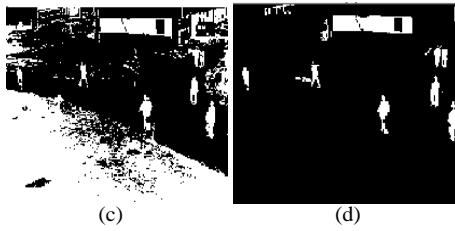

(a)	(b)

(c)   (d)

Fig. 2. Preprocessing sublevels results. (a) Original image, (b) Guassian filtered method, (c) Inverse image and (d) region filtered.

B. People detection

After preprocessing stage, binary image is used for object detection. At first, background area is removed to extract foreground objects; therefore, multivalued threshold is used to filter objects based on area of objects. In addition, connected regions [33] using 4 neighboring pixels are extracted using eq. (5).

$$I_{cc} = \{I_{q(x+1,y)},\ I_{(x-1,y)},\ I_{q(x,y+1)},\ I_{q(x,y-1)}\} \qquad (5)$$

where $I_{q(x,y)}$ is pixel value at x and y coordinates and I_{cc} is region connected through 4 neighboring pixels. After extraction of connected regions in image, area of each region has been calculated using eq. (6). Meanwhile, area of an object is defined as the number of the pixels $p(x, y)$ of particular object O [34] which is represented as;

$$A_o = \{p(x,\ y)\,|\,p(x,\ y)\ \square\ O\} \qquad (6)$$

where A_o is area of object and $p(x,\ y)$ is the value of pixels belongs to O. Area of each object is used to filter the objects of interest using eq. (7).

$$I_f = \left\{ \begin{array}{l} 1\ for\ A_o > t1\ and\ A_o < t2 \\ \\ o \\ oth\ erwise \end{array} \right\} \qquad (7)$$

where I_f is filter image, A_0 is area of region greater than value of lower threshold t1 and less than upper threshold t2. Fig. 3 shows few objects detection cases from Pets 2009 datasets.
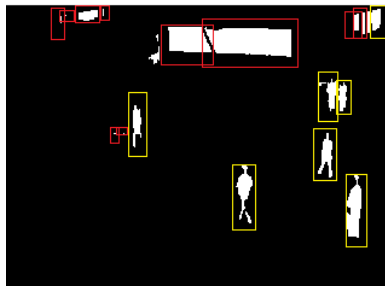

Fig. 3. Object detection. (a) Yellowboxes present detected objects and (b) red boxes showfiltered objects

C. Human verification

A next step after object detection is people verification method. This method is based on hybrid approach which includes skin verification and centroid based body point's detection processes.

For skin verification, mask of original image has been created and applied on object detected to convert them into RGB image. Consequently, RGB image is converted to YCbCr domain [35] and value of colored pixel of Cb and Cr channel using eq. (8) are used to detect skin pixels for each silhouette as shown in Fig. 4.

$$[r, c, v] = (I_{Cb>=t1\ \&Cb<=t2\ \&Cr>=t3\&Cr<=t4}) \qquad (8)$$

where t_1 and t_2 are lower and upper threshold values of channel Cb in YCbCr domain and t_3 and t_4 are lower threshold and upper threshold values of channel Cr in YCbCr domain , respectively.

(a)

(b)

(c)
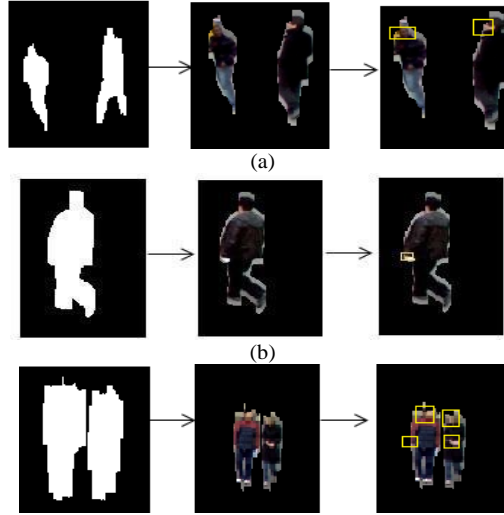
Fig. 4. Skin detection as focal point.(a) face, (b) hands and (c) combined results

For silhouette verification, we extract body point's boundary of each detected object and centroid of each object is marked as shown in Fig. 5.
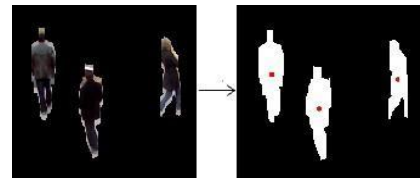
Fig. 5. Centroid detection of human with multiple poses

After assigning centroid as torso point, we applied local maxima and local minima to detect body's top point as head and bottom point as feet of human silhouette. Most right and left points are also extracted for each object detected in previous phase and considered as right and left arm as shown in Fig. 6 (a) and (b).

(a)

(b)
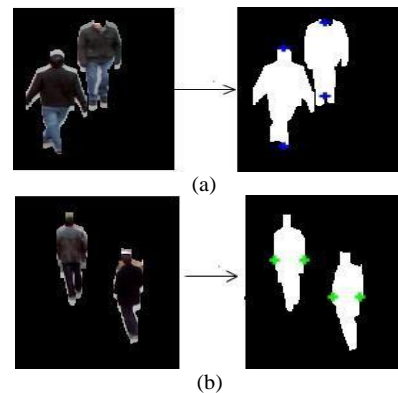
Fig. 6. Body parts detection. (a) Head and feet detection ofhuman silhouttes and (b) arm detection of multiple poses.

Euclidean distance is calculated between top to bottom point and right to left point (See Fig. 7). Such distance values are helped to declare object as human body, finalize the verification process and reduce the error rate.

(a)

(b)
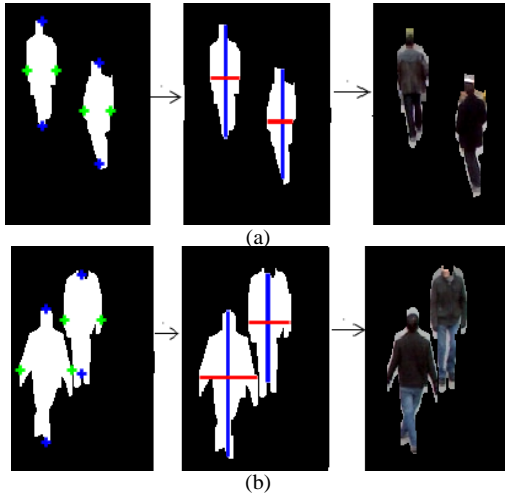
Fig. 7. Human verification methods. Euclidean distance between head and feet, left and right arm of detected silhouettes

D. People counting and tracking

In people counting phase, silhouettes verified in previous phase are labeled using component labeling and converted into colored labels. The main steps involve in people counting is identification of moving objects. We used centroid of each silhouette to detect moving objects in image and used its location to mark the counted people in this phase.

Moving objects are extracted with the help of x and y coordinates. Centroid for each moving object [35] is calculated using eq. (9) and eq. (10) as;

$$C_x = \frac{\left(\sum_{(i,j)\in o} P_{i,j} \cdot i\right)}{\sum_{(i,j)\in o} P_{i,j}} \qquad (9)$$

$$C_y = \frac{\left(\sum_{(i,j)\in o} P_{i,j}\right)}{\sum_{(i,j)\in o} P_{i,j})} \qquad (10)$$

where o is the set of coordinates of an object area, C_x presents centroid of x coordinates and C_y presents centroid of y coordinates. $P_{i,j}$ is pixel intensity value of i and j coordniates

(b)
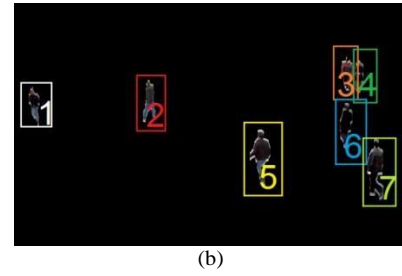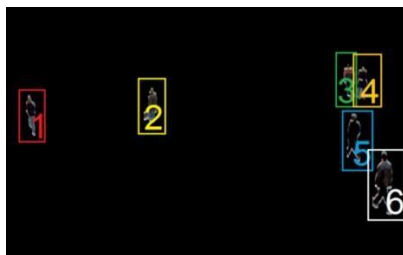
Fig. 8. Centroid based people counting. (a) people with count 7 and (b) people with count 6

For people tracking, centroid of each counted people is used as input in next frame and same is given as ground truth for extraction of jacquard similarity and centroid of next frame. Each previous frame parameter is considered as ground truth for next consecutive frame.

Meanwhile, if the centroid value changes from frame to frame beyond defined threshold, then object is considered as moving object and pointer is used to track that specific moving object between consective frames. Jacquard similarities $J(A, B)$ between objects of two different frames are calculated using eq. (11) and threshold value is defined to track the moving objects with combination of centroid coordinates [36] as;

$$J(A, B) = \frac{|A \cap B|}{|A \cup B|} = \frac{|A \cap B|}{|A| + |B| - |A \cap B|} \qquad (11)$$

where A and B are consecutive frames. There could be chance of having similar centroid value of 2 different objects that could lead to incorrect tracking, that's why jacquard similarity index with combination of centroid value is used to track the silhouettes. Fig. 9 shows the overall implementation results of people tracking phase.
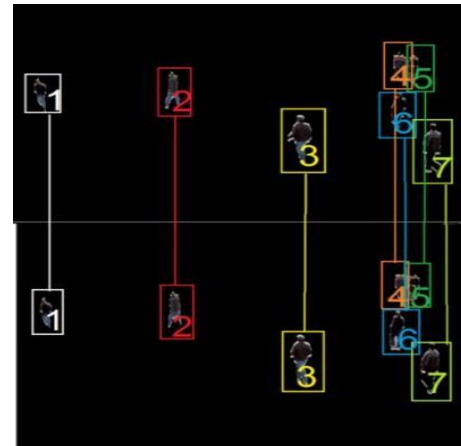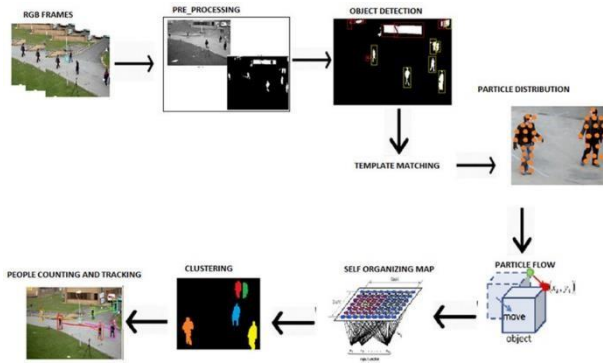
Architecture diagram
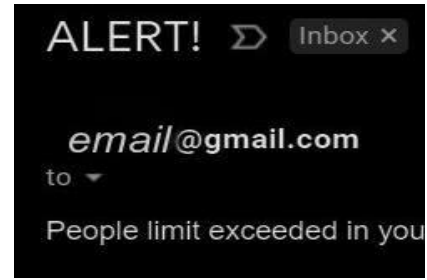
Detector Selected:

Centroid tracker:
- Centroid tracker is one of the most reliable trackers out there.
- To be straightforward, the centroid tracker computes the centroid of the bounding boxes.
- That is, the bounding boxes are (x, y) co-ordinates of the objects in an image.
- Once the co-ordinates are obtained by our SSD, the tracker computes the centroid (center) of the box. In other words, the center of an object.
- Then an unique ID is assigned to every particular object deteced, for tracking over the sequence of frames.

- **SSD detector:**
- We are using a SSD (Single Shot Detector) with a MobileNet architecture. In general, it only takes a single shot to detect whatever is in an image. That is, one for generating region proposals, one for detecting the object of each proposal.
- Compared to other 2 shot detectors like R-CNN, SSD is quite fast.
- MobileNet, as the name implies, is a DNN designed to run on resource constrained devices. For example, mobiles, ip cameras, scanners etc.
- Thus, SSD seasoned with a MobileNet should theoretically result in a faster, more efficient object detector

Real-Time alert:
- If selected, we send an email alert in real-time. Use case: If the total number of people (say 10 or 30) exceeded in a store/building, we simply alert the staff.
- You can set the max. people limit in config. (Threshold = 10).
- This is pretty useful considering the COVID-19 scenario

Threading:
- Multi-Threading is implemented in 'mylib/thread.py'. Consider using it if you ever see a lag/delay in your real-time stream.
- Threading removes OpenCV's internal buffer (which basically stores the new frames yet to be processed until your systemprocesses the old frames) and thus reduces the lag/increases fps.
- If your systemcannot simultaneously process and output the result, you might see a delay in the stream. This is where threading comes into action.
- It is most suitable for solid performance on complexreal-time applications. To use threading:
- set Thread = True in config

Scheduler:
- Automatic scheduler to start the software. Configure to run at every second, minute, day, or Monday to Friday.
- This is extremely useful in a business scenario, for instance, you can run it only at your desired time (9-5?).

Variables and memory would be reset == less load on your machine.

ex: Runs at every day (9:00 am). You can change it.
schedule.every().day.at("9:00").do(run)

Simple log:
- Logs all data at end of the day.
- Useful for footfall analysis.

III.   CONCLUSION

In this paper, we proposed a novel approach for people counting and tracking. We used body point's detection and skin verification for human verification. Centroid of each object is used to count moving objects. There is a bit limitation of our system that some objects that are nearest to border areas are considered as part of background and removed in background removal process. Overall accuracy of proposed system is 88.14% for people counting and 90.14% for people tracking.

In the future work, we will improve our preprocessing module more to enhance accuracy of object detection and resolve occlusion of multiple silhouettes to track them accurately.

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Satellite Internet Constellation

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Abstract—A Satellite Internet Constellation is a group of artificial satellites working together as a system providing satellite internet service. In particular, the term has come to refer to a new generation of very large constellations orbiting Low Earth Orbit to provide low-latency, high bandwidth internet service. Starlink is one of the Satellite Internet Constellations operated by SpaceX, providing satellite internet access coverage to 40 countries. It also has global mobile phone service after 2023. SpaceX started launching Starlink satellites in 2019.As of September 2022, Starlink consists of over 3,000 mass-produced small satellites in Low Earth Orbit (LEO), which communicate with designated ground transceivers. Space Exploration Technologies Corp. (SpaceX) is an American spacecraft manufacturer, space launch provider, and a satellite communication corporation headquartered in Hawthrone, California. It was founded in 2002 by Elon Musk

Index Terms—Satellite internet constellation, LEO, low-latency, high bandwidth, Starlink, SpaceX, One Web

1. INTRODUCTION

It may sound like science fiction but could soon be reality: a number of companies invest heavily in new satellite constellations to provide high-speed Internet access anywhere on Earth. The plan is to use satellites in low Earth orbit, that is, in relatively close proximity to the Earth's surface. A world-spanning network of thousands of such satellites is supposed to enable quick data connections and the transfer of large quan-tities of data. The leading company is the US's Starlink, which has already stationed the first satellite for a planned network of tens of thousands of satellites, a so-called "mega constellation". Several other US companies pursue similar plans. Like Star•link, they can count on the support of the US govern•ment. Their competition comes from China: its large state-owned companies in the space technology sector have announced that they too will be building their own constellations.

These plans for new satellite networks reflect the ever-increasing demands placed on the global Inter•net infrastructure – and the growing awareness of its political significance. Today, access to the global In-ter-net is a key factor for a country's economic de•vel•opment. But it also has a political dimension: more and more countries are attempting to tighten their control over the Internet's infrastructure and the flow of information. As with the construction of the first telegraph networks from the late 19th century on•wards, they want to expand their own communication possi•bilities. They also want to exert influence at the inter•face of technology and politics on the condi•tions under which information is exchanged world wide.

For now, it remains an open question whether the highly ambitious plans for satellite mega constellations can be put into practice. All the companies in•volved are facing a multitude of technical and eco•nomic challenges. If they overcome these challenges, however, the consequences would be far-reaching for Internet access, for the security and resilience of Internet infrastructure, and for power relations in global Internet governance.

To illustrate the range of possible developments and potential responses, this research paper considers two scenarios. In the first scenario, titled "**Global Oligopolies** ", three satellite mega constellations be•come operational, two under UK-US control and one Chinese project as part of the Belt and Road Initiative. The enormous concentration of economic power in this scenario also has political consequences: the availability of the constellations' services is defined by political lines of conflict. As a result, the Internet further fragments. The operators of the mega conglomerates and the countries behind them have fine-grained control over exactly how data within the respective systems, and between them, is exchanged. In this scenario, European countries, including Ger•many, find themselves virtually powerless to shape the use of digital infrastructures according to their own political interests and values.

The second scenario is titled "**Regulated Competi•tion**" and describes a world in which the new satellite constellations are regulated to ensure a certain level of competition. In particular, new World Trade Orga•nisation (WTO) agreements stipulate that – with only a few exceptions – the operators of the constellations may not themselves offer services for end users on Earth, but must instead cooperate with local com•panies for this. Targeted public investment and a close technological partnership with Japan also make it possible to build a European constellation. For Europe itself, but also for many other countries in the world, this produces an alternative to the US and Chinese systems. Close cooperation between the European Union and the African Union for the first time allows a large number of people in developing countries to access the Internet cheaply and reliably. This scenario sees the constellations partly become an instrument of vested geopolitical interests. But it does preserve the common global foundation of the Internet.

It is unlikely that one of these two scenarios will become reality in its entirety. However, the purpose of exploring them is not to provide prognoses for a probable future. Rather they illustrate the far-reach•ing political consequences that developments in the Internet satellite sector could have – and what possibilities exist for shaping these developments political

Fig. 1. Satellites in Low Earth Orbit (LEO)

2. INTERNET BY SATELLITE

A number of companies are pursuing plans for sup•plying fast and comprehensive Internet access via satellites in low Earth orbit. A dense network of satel•lites orbiting the Earth is supposed to provide cover-age for the entire Earth's surface. If the com•panies involved manage to implement their projects and put the satellite mega constellations into service, this would create a whole new dimension of global Inter•net infrastructure.

2.1 The Technology

Since the Soviet Union sent the first satellite, named Sputnik, into space in 1957, the importance of satel•lites has vastly increased. Today they are essentially used for three purposes: for positioning and navigation systems on Earth, such as the US Global Posi•tioning System (GPS) or the Automatic Identification System (AIS) used in shipping; for Earth observation for civilian purposes, such as weather or environmental research, or for satellite-supported military recon•naissance; and for communications and satellite television.

As a first approximation, it is possible to distinguish between satellites in geostationary Earth orbit (GEO) and those in low Earth orbit (LEO). GEO satel•lites are 35,786 km above the Earth at the Equator and move at the speed of the Earth's rotation. Viewed from the ground, they thus appear to be stationary in the sky. By contrast, LEO satellites circle the Earth at the relatively modest distance of 160 to 2,000 km. They move faster than the Earth rotates, and are there•fore only ever accessible for a limited time from any fixed point on the ground .

GEO satellites have so far been of only limited use for Internet connections. Their greater distance to Earth means that data transfers take longer. This delay is barely noticeable when accessing websites. However, it does make itself felt with real-time appli•cations, such as video telephony.

The shorter delay (latency) in data transfer of LEO satellites is one of the key reasons why the planned mega constellations want to use them. However, the challenge here is that LEO satellites, as described above, continuously orbit the Earth. They are there•fore only ever accessible for a short period of time from any one point on Earth. To provide lasting and reliable Internet connections nevertheless, the plans stipulate the construction of comprehensive webs of LEO satellites. Despite the satellites being permanently in motion, connecting to at least one satellite should thus always be possible.

What we know about the bandwidth of LEO satellites

In recent news reports, Starlink representatives claimed that individual Starlink satellites can reach a data bandwidth of 17 Gbit/s. If Starlink were to station 10,000 satellites, this would theoretically lead to an overall data transfer capacity between the satellites and users on Earth of 170,000 Gbit/s, or 170 Tbit/s. In the event of a full deployment of the planned 48,000 satellites, this capacity would rise to 816 Tbit/s. To put these numbers into per•spective: the recently announced Facebook-owned submarine cable "2 Africa" that connects the entire African continent with Europe is supposed to have a transfer capacity of 180 Tbit/s.

Satellites in Low Earth Orbit (LEO)
Schematic representation

Orbits of LEO satellites

Section

LEO satellites

Communications
End-user devices connect to the satellites, which can communicate with each other and are linked to Internet on the Earth via ground stations.

ground station

geostationary orbit
35,786 km

geostationary satellite

Low Earth Orbit
(LEO) 160 to 2,000 km

In March 2020, during the first wave of the Covid-19 crisis in Europe, the Internet Ex•change Point (IXP) DE-CIX in Frankfurt reported a new world record of data throughput amounting to 9 Tbit/s.[a]

The designs of the planned constellations vary greatly. Some companies want to station networks of several tens of thousands of satellites while others "only" aim for hundreds.

Many of the companies that are new to the market of satellite-supported communications – for instance SpaceX and Amazon, and some Chinese firms – have declared that their goal is to offer users a direct con•nection to the satellites. Users are supposed to be able to link up with satellites directly via antennas spe•cially designed for the purpose (so-called "phased array antennas"). These antennas are currently about the size of a pizza carton. They are designed to attach to buildings or to mobile objects such as cars, trains and boats. Other companies, including AST & Science, aim to provide direct satellite access using standard mobile phone technology. It is clear that a large number of satellites will be required to offer a large number of users fast reliable Internet access, what•ever the technology used for the connection. Accord•ingly, the companies plan constellations of several tens of thousands of satellites.

The company TeleSat, by contrast, represents a totally different approach: it plans to station rela•tively small constellations to act as a backbone pro•vider for local Internet Service Providers (ISPs). The initial thinking was for 300 satellites. By now, the company aims for up to 1,671 satellites. In principle its business model is similar to today's submarine cables. End users will be employing technology that is common today to connect to the local ISP. The ISP will then use special equipment to enable a link-up with the global Internet – in this case via satellite. Such a system can theoretically manage with a much smaller number of satellites since local ISPs can use much more efficient antennas than those that SpaceX, for example, is planning for its end users, and since local ISPs pool end user requests.

To offer Internet access via satellite, the satellite systems have to be connected not only to end users but also to the physical Internet infrastructure on Earth. At the moment, most companies do not plan for each LEO satellite to connect to these ground stations. Rather, the satellites are meant to form a network so that data can be directly transmitted between them. It would thus be sufficient if certain units within the network communicated with the ground stations.

A number of companies are working on technical solutions based on laser beams to make exchanging data between satellites possible. These are called Inter-Satellite Laser Links (ISLLs). In principle, this tech•nology has the potential to transfer data at the speed of light. Unlike today's underground and submarine cables, it will require no elaborate or delicate "cabling". Some approaches aim to use this laser technology also for the connection between satellites and Earth. The Bavarian company Mynaric, among others, works in this field. In a decision that became public knowledge in July 2020, the German government blocked Mynaric from exporting its products to China.[15] This shows how crucial this technology is believed to be**The Most Important Companies**

Advances in rocket technology and the mass produc•tion of satellites have reduced the expected costs of stationing mega constellations in low Earth orbit to such an extent that these projects have become eco•nomically conceivable. With few excep•tions, the busi•ness model for satellite-supported communications has so far been based on stationing a small num•ber of geostationary satellites. Manufacturing and sta•tioning costs for these satellites are very high, at approximate•ly US$150 to 500 million per satellite.

In contrast, the planned LEO mega constellations will be using new launch vehicles such as those devel•oped by SpaceX. A key factor in this context is that SpaceX's carrier systems can be reused, which sub•stan•tially reduces the costs of launches. SpaceX CEO Elon Musk has told the press that the cost of manufacturing and stationing the satellites currently stands at US$500,000.[17] Based on these numbers, building a constellation of 10,000 satellites would cost around US$5 billion in total.

The high initial investments, however, are only one of the economic challenges to be overcome if the plans for new LEO constellations are to be imple•mented.[18] Urban centers, for example, are attractive markets with many solvent customers – but there is also already a lot of fierce competition in these mar•kets. Moreover, substantial additional investments would be required to be able to provide reliable Inter•net connections by satellite for large numbers of people concentrated in relatively small areas. Another challenge is the low purchasing power of end users in developing countries. Billions of people there still have no access to the Internet. One major reason for this is that it has so far not seemed lucrative to tele•communications companies to provide access. If the operators of the mega constellations want to offer their services in developing countries, they too will have to confront the low purchasing power of poten•tial customers.

This research paper focuses on companies whose objective is to offer broadband Internet connectivity using LEO constellations (see Figure 2). Along•side the big players, several smaller companies have announced their plans to provide such connections for the "Inter-net of Things" (IoT). For broadband-connec•tions, most of the companies plan to use radio frequencies in the Ku and Ka bands; some are also considering the V and Q bands.

Other companies are banking on satellite connections with a more limited transmission capacity, as Iridium Communications did as long ago as the late 1990s. Using VHF and UHF bands, the idea is to pro•vide specialized IoT services, for which low transmission capacity is sufficient.
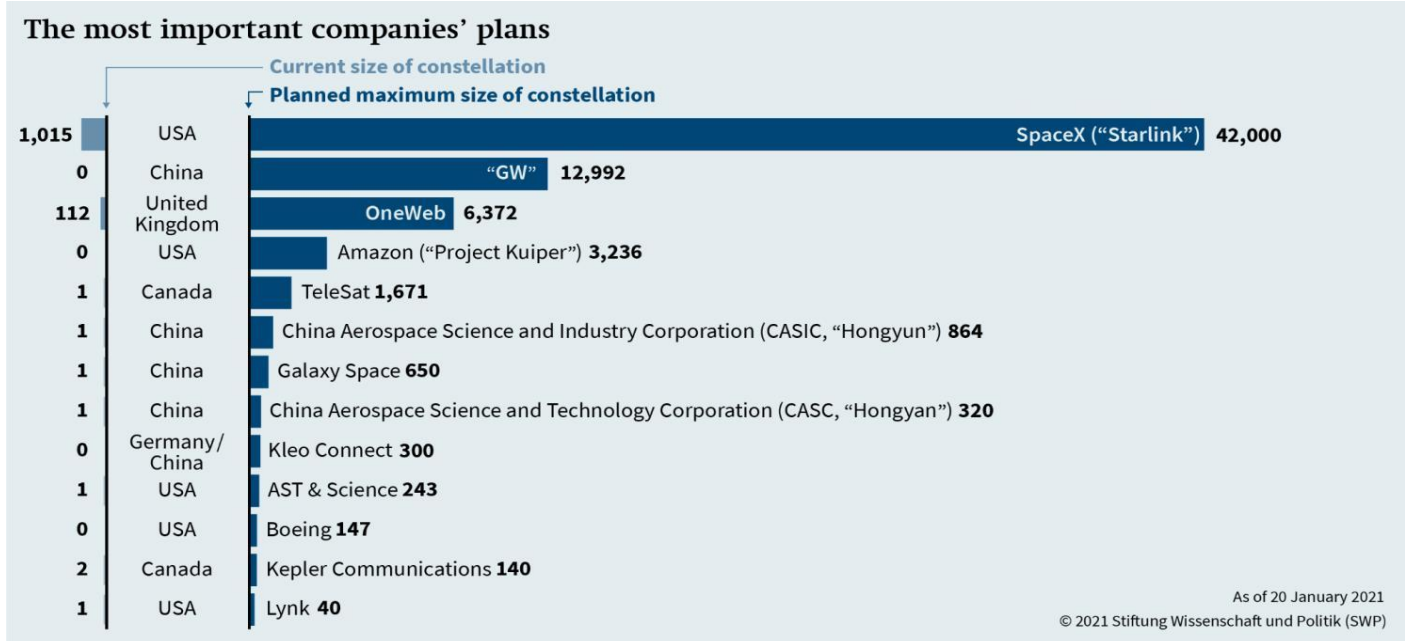
The most important companies' plans

Fig. 2. The Most Important Companies

2.2 FREQUENCY ALLOCATION

Since 1959, the ITU has had the mandate to coordinate the international allocation of radio frequencies, including those needed for satellite communications. It also coordinates orbital positions of satellites. This work is today carried out by ITU's Radiocommunication sector (ITU-R). Major decisions are made at the World Radio Conferences, which convene at least every four years.

ITU-R's function in coordinating radio frequencies essentially consists of a rather elaborate procedure to confirm whether a justified interest exists in using a specific frequency range.[33] The basic principle guid-ing this decision can be simplified as "first come, first served". Whoever files first has priority. All other coun•tries and companies that might subsequently wish to use the same or neighboring frequency ranges will have to come to an arrangement.Private businesses cannot represent themselves in this procedure. Instead, governments act on their behalf and notify the ITU of the use of certain fre•quen•cies. Often, countries apply for frequency use by companies from other nations. In 2015, for example, Norway registered 4,527 satellites and the correspond•ing need for frequencies on behalf of SpaceX.[34] Com•panies seem to find it an attractive option to register their interests with the ITU via a number of different countries. This allows them to circumvent specific rules of individual national regulatory bodies. Many countries, for their part, deliberately do not distinguish between domestic and foreign companies. They have an interest in receiving the relevant fees, and hope for intensified economic relations with the com•paniesIt is becoming increasingly problematic, however, that the ITU's coordinating function was originally devised for a different practice. The enormously time-consuming procedures date from a time when the total number of satellites stationed in space was manageable. The growing number of applications for mega constellations risks overburdening this allocation system.

The size of the constellations currently being planned also challenges the ITU's basic mechanism of frequency attribution. If finan•cially powerful companies with plans for mega conglomerates lay claim to large ranges of frequencies that are attractive for data transmission, these fre•quencies became a rare commodity. The "first come, first served" principle then risks becoming a hurdle for new arrivals. Back when there were fewer satel•lites, the parties involved were, in most cases, per•fectly able to reach a voluntary agreement. Now real distribution conflicts are looming.

At the global level, the use of radio frequencies in space is coordinated by the ITU. However, countries reserve the right to regulate the use of radio frequencies on their territory, including their airspace. They can bring to bear security considerations, but also efforts to protect existing forms of use against disrup•tion. In Germany it is the Federal Network Agency (Bundesnetzagentur) that is in charge of such matters.

2.3. Development of Standards and Protocols

Data transmission within constellations of tens of thousands of satellites that are constantly in motion, as well as data transmission between the constellations and users on Earth, will necessitate entirely new software protocols, or at least the adaptation of exist•ing protocols. Thus far, it is organizations such as the Institute of Electrical and Electronic Engineers (IEEE), the Internet Engineering Task Force (IETF) and, for specific areas, the ITU, that have developed such standards and protocols.43.

Discussions on this subject have in fact been open•ed within the IETF.44 In late 2019 China pro•posed at the ITU that an entirely new Internet proto-col, to be known as "NewIP", be developed. It has since dropped the idea in the face of massive criti•cism. One aspect is nevertheless interesting: China once again linked its proposal with the plans for LEO mega constella•tions.

2.4. Possible Futures: The Global Internet in 2035

It is not possible to *predict* future developments in the field of Internet satellites. Yet we can systematically explore the range of possible, and plausible, future scenarios. One entirely plausible scenario is that we will never see a fully operational mega constellation of Internet satellites. The technological, economic and political challenges are huge, and may eventually turn out to be insurmountable even for the most ambitious actors in the field.

In what follows, however, I want to take a closer look at how things might develop if these challenges can be tackled (see Figure 4). Exploring two scenarios, I will examine the implications for three key aspects of global Internet governance: Internet access, the secu•rity and resilience of the global Internet infrastructure, and power relations in global Internet governance. Related issues of space governance – from the modifications that will need to be made to space legislation to concerns over increasing space debris – cannot be covered here.

To structure the range of possible developments, I sort them along a spectrum defined by the *degree of competition*. This variable, in turn, has two components (see Figure 4). First, it reflects how many opera•tors of planetary mega-constellations compete in the market for broadband satellite Internet connectivity. Second, it captures the degree of vertical integration. The question here is whether the mega constellations "only" serve as backbone operators for terrestrial tele•communication providers or, instead, turn into full-service operators that directly service individual cus•tomers. It is not very likely that the actual develop•ment will neatly correspond to one of these scenarios. Rather, we can expect to see a mix of elements from both scenarios. Instead, the goal is to illuminate the range of possible developments – and their political implications.

This heuristic approach also helps to inform up•com•ing political decisions. Put simply, given the objectives German policymakers have set themselves for global Internet governance (see chapter 1, p. **7**ff.), the first is a worst case scenario that must be avoided. Developments are not straightforwardly positive in the second scenario either. Yet it at least clarifies the building blocks and preconditions of a worthwhile development.

To sketch a vivid picture of these two possible futures, I use the names of specific companies and countries. Although the results of my analyses in the previous chapters feed into the scenarios, I want to emphasize here that the narratives are fictional.

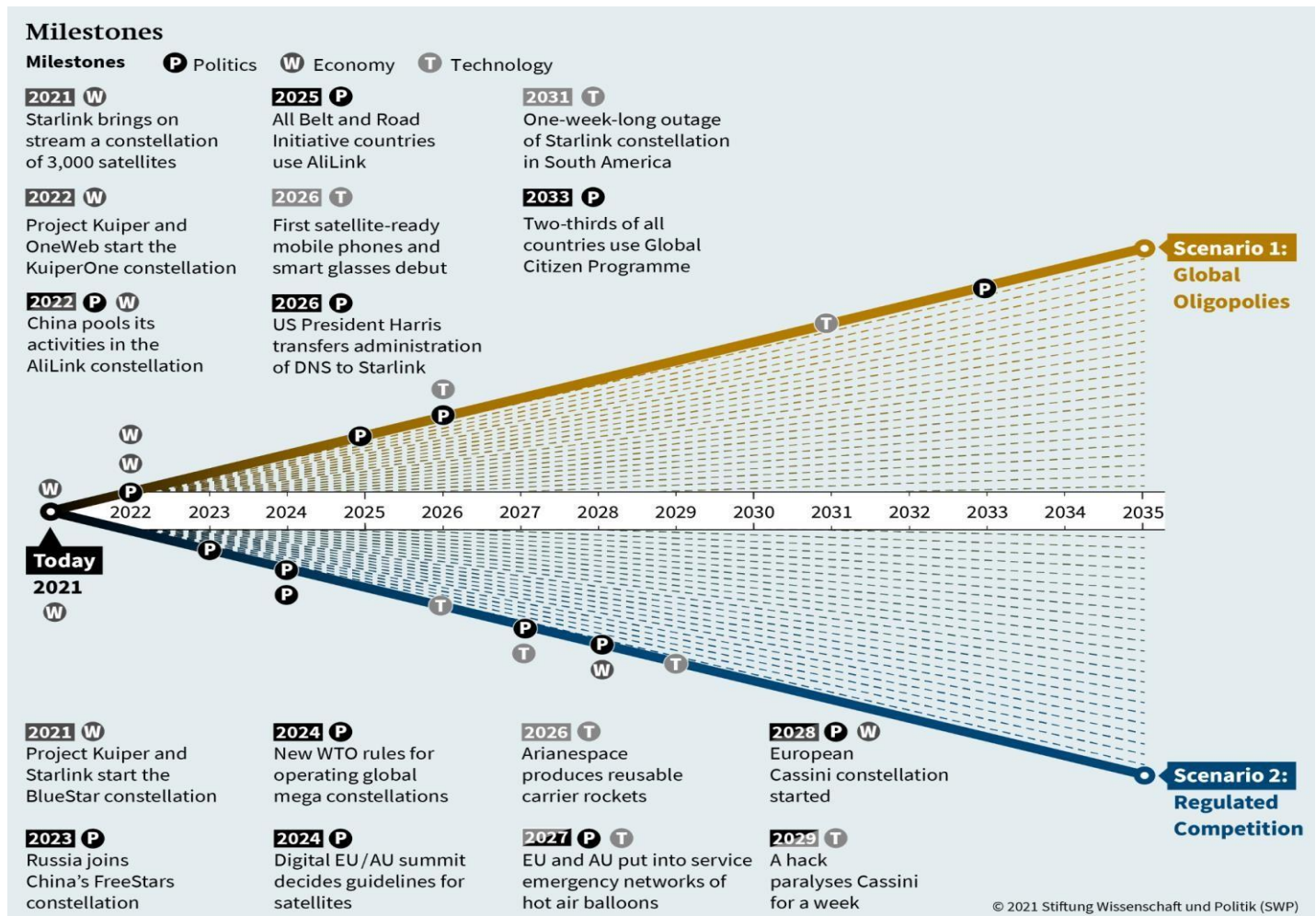Fig. 3. *Table* Degree of competition in the two scenarios

		Number of constellations	
		low	high
Vertical Integration	low		Scenario 2: Regulated Competition
	high	Scenario 1: Global Oligopolies	

3. Scenario 1: Global Oligopolies

With some delays, in late 2021 Starlink extends its LEO constellation to 3,000 satellites, covering 60 per•cent of the Earth's surface. The constellation focuses on regions in the Northern hemisphere, with a par•ticular emphasis on the US and Canada. At about the same time, Amazon subsidiary Project Kuiper and OneWeb form a joint venture called KuiperOne. In 2022 KuiperOne commences regular operations of its satellite constellation. Starlink and KuiperOne offer backbone services, i.e. high-performance background networks, for local Internet service providers and data centers. They also enable direct connections for end users. In rural parts of the US, they cooperate with Verizon and AT&T, whose customers can resort to satellite connections when local networks are insuf•ficient. Starlink and KuiperOne are also targeting the end user directly. For a starting price of US$99 a month, customers can book a data package of 100 Gigabyte (GB), for which they can connect directly to the satellite constellation. The special antennas required for this resemble the first mobile phones in their

Domestically, the US government financially sup•ports Starlink and KuiperOne through a programme to expand broadband access in rural areas and as part of defence ministry projects. In their international ac•tivities, the two companies benefit from programmes run by the United States Agency for International Devel•opment (USAID) to support the construction of Internet infrastructure in developing countries. US foreign policy also backs them: on a State Department initiative, a memorandum entitled "Internet Satellites and National Security" is signed by the other four mem•bers of the Five Eyes intelligence alliance – the UK, Canada, Australia and New Zealand. They thus commit to supporting the activities of Starlink and Blue Origin. Other countries subsequently make the same voluntary commitment, including Poland and the Baltic states.

The Chinese government, for its part, organises the deployment of a Chinese mega constellation. As in the US, a number of Chinese companies initially com•pete with each other but in 2021 the government con•centrates all these efforts. A new state-owned enter•prise named AliLink is founded to integrate all previous efforts and the Chinese Communist Party creates a new sub-committee to efficiently coordinate its future development. Until 2025, the Russian gov•ern•ment pursues plans for a Russian mega con•stella•tion that is supposed to build on the GLONASS satel•lite navigation systems. Due to ever greater economic constraints, however, in 2025 President Putin nego-tiates a strategic partnership with China. Russia's efforts up to that point are integrated into the AliLink system, which is now available in Russia too

.As part of these consolidations, many European sup•pliers are bought up by one of the three big op•era•tors. Only a few manage – with the support of their respective governments – to retain their independ•ence and assert themselves in a niche of the global market.

Milestones

Milestones Ⓟ Politics Ⓦ Economy Ⓣ Technology

2021 Ⓦ
Starlink brings on
stream a constellation
of 3,000 satellites

2025 Ⓟ
All Belt and Road
Initiative countries
use AliLink

2031 Ⓣ
One-week-long outage
of Starlink constellation
in South America

2022 Ⓦ
Project Kuiper and
OneWeb start the
KuiperOne constellation

2026 Ⓣ
First satellite-ready
mobile phones and
smart glasses debut

2033 Ⓟ
Two-thirds of all
countries use Global
Citizen Programme

2022 Ⓟ Ⓦ
China pools its
activities in the
AliLink constellation

2026 Ⓟ
US President Harris
transfers administration
of DNS to Starlink

Scenario 1:
Global
Oligopolies

Today
2021

2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035

2021 Ⓦ
Project Kuiper and
Starlink start the
BlueStar constellation

2024 Ⓟ
New WTO rules for
operating global
mega constellations

2026 Ⓣ
Arianespace
produces reusable
carrier rockets

2028 Ⓟ Ⓦ
European
Cassini constellation
started

Scenario 2:
Regulated
Competition

2023 Ⓟ
Russia joins
China's FreeStars
constellation

2024 Ⓟ
Digital EU/AU summit
decides guidelines for
satellites

2027 Ⓟ Ⓣ
EU and AU put into service
emergency networks of
hot air balloons

2029 Ⓣ
A hack
paralyses Cassini
for a week

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The use of satellite Internet has a breakthrough when, in 2026, a first generation of new "satellite-ready" mobile devices reaches the market. They no longer require special antennas to link to satellites. Mobile phones and the now very common digital "smart glasses" can directly connect to satellites, using existing mobile telephone protocols as well as new protocols that are custom-made for satellite communications. Since the three big satellite opera•tors employ different frequencies and are not tech•nically compatible in further ways, connecting to the satellite constellations from end user devices requires specific hardware modules. These modules are licensed by the operators of the constellations. Citing fears of espionage and sabotage, the US and its allies ban the use of the Chinese hardware modules. Like•wise, China and Russia ban the use of the US-based modules.

From 2024 on, within each of the three systems, data is transferred between satellites via Inter-Satellite Laser Links (ISLL). A growing number of satellites serve as distributed data centres. Like earlier terres•trial content-delivery networks (CDNs), these data-satellites cache frequently requested content such as video streams.The transfer of data between the three constellations takes place at Planetary Exchange Points (PXPs). In an initial phase, these are

operated on Earth. The US and China informally agree that roughly half of the PXPs are stationed in locations that are controlled by one of the two states. By 2030, the US and China publish plans for moving the PXPs into space, ex•plain•ing that they want to avoid depending on the host states of the locations where the PXPs were pre•viously stationed

The continuous expansion of the three constellations also puts the operators in a position to compete directly with local telecommunications providers. Attempts by a few European countries to create new WTO rules to avoid this competition between the global satellite operators and local companies have failed. As a consequence, in rural and sparsely popu•lated areas, local ISPs increasingly find it difficult to compete with the operators of the satellite.constellations. In densely populated areas, the operators use local relay stations that simultaneously connect to multiple satellites for more bandwidth. End users can

connect to the relay stations via different protocols, e.g. 6G and WIFI6. The satellite operators thus grad•ually turn into serious competition for local ISPs even in urban spaces.

By 2035 this results in three fully operational mega constellations. Two – Starlink and KuiperOne – are owned by private enterprises subject to the jurisdiction of the US and its closest allies. The third constel•la•tion, AliLink, is run by a Chinese state-owned busi•ness and actively supported by the Russian government. The two Western constellations dispose of over 10,000 satellites each, the Chinese one has over 14,000. Almost 60 percent of the world's Internet data flow passes through these three constellations. Around two-thirds of the Earth's population regularly use them to access the Internet. However, distribution is un•equal: while rural areas almost exclusively use satellite Internet, many cities increasingly turn to fibre optic connections. What does it all mean for global Internet governance in 2035?

3.1 ACCESS

In principle, all three systems can be configured to cover every spot on Earth. In light of the intense politi•cal controversies over these systems, however, their actual coverage is shaped by political considerations. The two Western constellations primarily cover North and South America, allied states in Europe and the Pacific, and parts of Africa. The AliLink constellation can be accessed from China, Russia and all Belt and Road Initiative (BRI) countries. Since 2025 Hun•gary, Turkey, India and a number of African countries have joined the BRI. As promised by the operators, the constellations offer connectivity in many rural areas that, as recently as the 2010s, had no Internet access whatsoever.

By 2035, 1 billion people in developing countries have, for the first time in their lives, gained access to the Internet via the new satellite constellations. More than 70 percent of all schools in African states are also connected to the Internet through them. Using subsidies and credits, the World Bank, the Asian Devel•opment Bank and individual donor countries supported the expansion of the satellite constellations to give reliable coverage of the Southern Hemisphere as well. In the early years, however, the expense of the more specialised antennas and the still comparatively high user fees for satellite Internet were a sub•stantial obstacle. The breakthrough came in the late 2020s when the first inexpensive mobile phones arrived on the market with integrated hardware mod•ules for connecting to the satellite constellations.

When the mega constellations were first being built, the assumption was that developing countries would undergo a process similar to Western nations, which have connected to the Internet since the 1990s. Unlike then, however, governments in the early 2020s were well-prepared. From the offset Internet use was controlled by each country's political rules. Many Western companies rushed into the African market from the mid-2020s onwards, drawn by the millions of potential customers. Some countries, including Ghana, nevertheless managed to promote their own digital economy.

3.2 Security and Resilience

Since almost all essential network elements are in the handsof the big three operators, they have more con•trol over what happens on the networks. For instance, they can rapidly install security updates for protocols and individual software components.

The US and Chinese governments also view this cen•tralised structure as a security gain. Using the respec-tive operator's special interfaces, they can com•prehensively monitor the data flows within the net•works. They can thus also decide in detail which data enter or leave "their" networks at the PXPs. Finally, both governments reserve certain capacities within the constellations for military purposes, for both them•selves and their closest allies. By 2035 many coun•tries have their own satellite networks for "net-work-centric warfare". However, it is considered a major strategic advantage to also be able to draw on the gigantic civilian constellations.

Soon, however, a previously unknown issue emerges. Since the constellations increasingly go their own ways in terms of technology, targeted attacks on individual constellations become possible without endangering one's own network.

Some observers had originally hoped that the mega constellations would complement the network of sub•marine cables and thus augment the resilience of the system as a whole by adding redundancy. However, after only a few years, the progress made in data trans•mission in space via ISSL led to investors with•drawing from plans for new submarine cables. While in 2025 90 percent of the intercontinental data flow still passed through the submarine cables, that figure has dropped to 20 percent by 2035.

The risks of increasingly relying only on the satellite constellations became evident during a large-scale outage in 2031. Starlink's constellation suffered from a serious and widespread malfunction, effectively cutting off Internet access for almost all South Ameri•can states. The few remaining submarine cable con•nections were unable to fill the gap left by the mal•functioning satellites.

It soon became clear that the outage was caused by satellites that had been among the first to be deploy•ed. Their necessary software update of earlier that year included a bug, which was triggered on 28 June 2031. With the help of KuiperOne, basic coverage was restored within a few days. For two weeks, however, Internet access was limited to public institutions and select private companies of strategic relevance. After two weeks, Starlink found the bug and updated the malfunctioning satellites. As soon as Internet access in South America was restored, social media was abuzz with mass criticism of Starlink and the gov•ern•ments of Latin America. In response to the protests, in early 2032 the three big satellite operators agreed on

the constel•lations.

3.3 Power in Global Internet Governance

Many different actors used to operate the Earth's Inter-net infrastructure as it developed across the world from the 1990s onwards. Above all, there were a large number of private companies that managed its different parts – from submarine cables to IXPs to local ISPs. By contrast, in 2035 the operators of the three satellite constellations are characterised by a high degree of vertical integration: they combine almost all elements of the Internet infrastructure.

The reduced number of entities involved in running major parts of

With the exception of the US, China and their respective allies, the influence of individual states on the operation and future the global Internet infrastructure makes coordination between them much easier. The three companies – Starlink, KuiperOne and AliLink – jointly work on the standards necessary to enable the data exchange between the three systems at the PXPs. To formalise their cooperation on this issue, they estab•lish the Planetary Connectivity Organisation (PCO).

In the early years, whenever they needed to agree on the use of certain frequencies, the operators still went through the procedure established by the Inter•national Telecommunication Union (ITU). Soon, however, it became abundantly clear that the ITU allo•cation process was not suited to such enormous constellations. In 2025, with the agreement of their governments, the three companies therefore decided to allocate frequencies within the PCO instead. While the ITU procedures still exist in 2035, the organisation is now essentially reduced to accommodating the PCO's decisions.

Shortly thereafter, in 2026, the US government under President Kamala Harris decided to transfer the task of managing the Domain Name System (DNS) to Starlink. It justified this as the next logical step in the process that had begun in 2016 with the handover of this responsibility to the Internet Corporation for Assigned Names and Numbers (ICANN). In response, China and Russia opted to build their own "sovereign DNS". This has been administered by AliLink since 2027. For some observers there was a certain irony in the emergence of the first truly global communications systems being accompanied by the long-feared, politically motivated fragmentation of the Internet. The three big satellite companies quickly agreed stand•ards within the PCO to enable exchange be•tween con•stellations, despite the two separate Domain Name Systems. Since the operators now also control the re•spective DNS, they have an added means of steering data flow between the constellations. For example, the Chinese system very quickly prohibited access to the Taiwanese top level domain .tw, which continues to be used in the West. All three systems also use DNS to prevent crime.

The three operators host regular multi-stakeholder conferences to discuss the future development of the constellations. The PCO, too, has a multi-stakeholder advisory board (MAB) that is open to governments, private businesses and civil society. In 2029, a group of Western civil societies jointly declares that they will no longer

development of the constel•lations is limited. All three constellations,

however, offer special services for governments that allow them to configure their services in line with local laws and regulations ("Governance as a Service"). Many gov-ern-ments seize this opportunity, though some criticise the lack of transparency about how exactly the three operators implement their legal requirements.

As an additional service, all three operators offer "global citizen" programmes. These make it possible to apply certain regulations to citizens of a state wher•ever they find themselves

attend these meetings, calling them a mere façade meant to legitimise the extraordinary power of the three companies operating

on Earth. When citi•zens travel to other countries, their digital communications thus remain within the jurisdiction of their home state. In 2035 two-thirds of all countries use this programme. However, it also has its limits. To preserve the freedom of the Internet, the US govern•ment insists that, within the global citizen programme, Starlink and KuiperOne must not restrict freedom of expression or data protection more than in the US. Similarly, in matters of freedom of expres•sion the Chinese government commits AliLink to ad•hering to the guidelines of the final declaration of the 2028 World Internet Conference in Wuzhen. In 2030 the EU decided to embed exceptions in its legislation that allow the satellite constellation operators to continue to offer their services legally in the EU. Its decision was based on an extensive debate and past experience with the Privacy Shield.

4. Scenario 2: Regulated Competition

In late 2021 Elon Musk and Jeff Bezos take the public by surprise when they declare that they will henceforth combine their efforts to build a global LEO con•stellation in a new company called BlueStar. Shortly thereafter OneWeb also joins. At the turn of the year 2022-23, BlueStar puts into service a constellation whose satellites cover the entire Northern hemisphere as well as South America and parts of Africa.

To remain competitive against BlueStar, the Chinese government decides in early 2022 to combine all its previous initiatives in an LEO constellation called FreeStars. In 2023 China and Russia announce that they will closely coordinate their activities in space as part of a strategic partnership. Russia then drops its plans for its own LEO constellation and joins FreeStars. The constellation comes on stream in late 2024 and provides satellite coverage for all of Asia, Russia, Eastern Europe and large parts of Africa and India.

Also in late 2021 the European Council agrees to support the

Harris criticises it for unnecessarily splitting the Western-libera
camp. Congress is even harsher, suggesting Europe

shouldhonour its NATO obligations rather than hurt American
s through illegal subsidies. The EU is not deterred and
sticks to its plans. In 2022 it signs a new agreement with Japan
to intensify cooperation in digital technology; this paves the
way for closer collaboration in satellite communications

The following year European companies form a joint venture called
Cassini, with the objective of building an independent European
LEO constellation. The European Commission supports Cassini
financially for research and development. A number of EU mem•ber
states also commit to using the system to con•nect public institutions
in sparsely populated regions. It soon becomes evident that Cassini
can benefit from a network of European subcontractors in the space
tech•nology sector. The joint venture receives a further boost in
2026 when Arianespace succeeds in produc•ing a launch vehicle
that, like the SpaceX systems, can land on Earth and can thus be
used several times. The Cassini constellation begins operation in the
sum•mer of 2028. As a latecomer to the scene, it has to come to an
arrangement with the already existing constellations for using radio
frequencies. This is not a problem over Europe, but in some parts of
the world Cassini can only offer a limited service. In late 2028 the
US, China and Russia ban the system from operating on their
territories with reference to nation•al security issues. President
Harris expresses her regret at being forced to take this step, pointing
to NSA findings that the Cassini system is not sufficiently secure to
operate in the US.

In the beginning, BlueStar, FreeStars and Cassini provide both
backbone services for local ISPs and an end user service. For an
average fee of US$100, users can connect directly to the
constellation. As of 2024, however, new WTO rules change the
market dy•nam•ics. Member states agree that constellation operators
can henceforth only offer backbone services. In the preceding WTO
debate, a number of countries point•ed out that similar rules had
proved very effective in the electricity market. The new WTO
regulations also confirm that the GATS rules apply to satellite
services as well, and emphasise that countries are obliged to treat
domestic and foreign companies equally where access to national
markets is concerned.The WTO regulations, however, contain two
excep•tions. In areas where no local ISP provides Internet
connectivity, the operators of the satellite constellations may apply
for a license to serve as ISP. All three take advantage of this
opportunity, especially in devel•oping countries . By 2028 FreeStars
subsidiaries have already built local ISPs in 50 countries; BlueStar is
represented in 40 countries; Cassini in only 12. The second
exception to the WTO rules is that the con•stellation operators are
allowed to offer direct access to their constellation as a special
service to certain customers with specific needs. In many countries,
this service is initially limited to airplanes and ships. However, some
soon begin expanding the circle of those eligible for the special
service to officials and law enforcement authorities. Singapore
additionally introduces an exception for "international business
agents".By 2035 three LEO constellations have developed: BlueStar

the Internet. In rural areas and developing countries, the systems
often provide the most im•portant Internet access. Densely populated
economic centres, however, continue to rely primarily on fibre optic
connections.

has 13,000 satellites, FreeStars 12,000 and Cassini 6,000. Around
50 percent of global Internet traffic passes through the
constellations, with about two-thirds of the world's population
using them to access

4.1. Access

All three systems are technically capable of providing
connectivity for every spot on Earth. As described above,
BlueStar and FreeStars were able to reserve for themselves the
most attractive radio frequencies. In some places, this limits the
availability of Cassini's services. Decisions over local licenses,
moreover, are often shaped by political considerations. As a
result, the technical configuration of the constellations
in•creasingly reflects political divisions. The US, China and
Russia prohibit satellite networks on their terri•tory that are not
at least in part operated by domestic companies. Furthermore,
the US and China emphati•cally try to convince their respective
allies to adopt a similar policy. As a result, in 2035 vast areas of
the world are divided into two digital spheres that are largely
separate from each other. In each sphere, the Internet can only
be used via one of the constellations.

The EU, however, is the centre of a group of countries that
remains committed to the new WTO rules of 2024. It allows all
three operators access to their markets. Within the EU, the
decisions by the US, China and Russia not to allow Cassini
access to their markets lead to a heated debate about retaliating
by excluding the other two systems. In the end, however, the
EU member states re-affirmed their commitment to the
multilateral trade system and to free communication. In 2025
Brussels also tightens the rules on data protection by reforming
the ePrivacy act. Local ISPs using one or the other of the non-
European satel•lite constellations now have to take extra
measures to protect their customers' data, for instance through
appropriate forms of encryption or pseudonimisation, or
informed user consent to data processing outside the EU.
Finally, both FreeStars and BlueStar are banned from offering
their services near strategically important sites such as military
bases or energy plants. To enforce this ban, the EU sets up
technical systems to locally block the frequencies used by these
two systems.

Also in 2024 the EU and African Union (AU) hold a digital
summit under the banner #Digital4All. The final document
contains a series of targets that operators of satellite
constellations must meet to be able to receive financial support
from international development agencies. These include
operators hav•ing to provide publicly accessible information on

services. A num•ber of large donor states implement these guidelines in the following years. The UN Secretary-Genera also publicly endorses them.

The EU also supports the AU with technical exper•tise in its application to the ITU for the use of radio fre•quencies suited to provide broadband satellite-con•nec•tivity over the entire African continent. The objec•tive is to ensure that African companies retain the oppor•tu•nity to enter the market at a later stage. Many demo•cratic governments in Africa decide to use the Euro•pean Cassini system in the meantime, so as to con•nect public institutions in remote areas to the Inter•net.

As a result, in 2035 all developing countries have connectivity to at least one of the three constellations. Following US and Chinese pressure, however, few coun•tries have access to all three. This comprehensive availability, however, emphasises a problem to which the AU-EU summit already referred in 2024. To be able to actually use the new satellite constellations, many regions first need to invest in mains electricity supply, both for the necessary infrastructure on Earth and for running end-user devices.

4.2 Security and Resilience

The constellation operators had to make it possible to transfer large volumes of data within networks of tens of thousands of satellites, which additionally move continuously at high speeds and in different orbits. To this end, they developed new protocols both for directing the data flows *(routing)* and for identifying end devices in the network. Many of the innovations introduced here were subsequently also taken up by the terrestrial Internet infrastructure. In devel••oping these protocols, the constellation operators were able to remove some weaknesses from the pre•viously widespread protocols. At the same time, docu•ments leaked in 2028 showed that BlueStar and FreeStars had also created new, undisclosed forms of "lawful access". These provide the governments of the US, China and Russia with powerful tools for moni•toring the global data flows.

The introduction of the new protocols for the satel•lite constellations initially caused cyber attacks to drop slightly. From about 2026, however, the rate of attacks increased again. In the interval, attackers had apparently found flaws in the new protocols as well. And while there is no proof yet, there are also con•cerns that some hacker groups have succeeded in exploiting the interfaces built into the systems to pro•vide access for national law enforcement agencies.

A particularly devastating attack occurred in 2029. Within just a few days, a virus spread globally through all satellite constellations. Although the virus was found on computer systems everywhere, the special twist of this virus was that it only harmed the Euro•pean satellite constellation Cassini. It corrupted a standard setting in the transfer protocol used by Cassini and thus effectively brought to a standstill all data transfers within that network. Luckily, many users of Cassini were able to switch to the two other systems, use terrestrial networks or resort to emergency mobile networks that had

event led to a heated debate, with many rumours circulating as to who might have an interest in specifically damaging the European been established in many European cities since 2027. After a week, Cassini experts managed to resume operation of the satellites and to update the system to protect it from similar attacks in the future. The satellite network. Since then, all three constellation operators have worried about further targeted attacks on one of their networks.

This new awareness of the satellite constellations' vulnerability also had an impact on how the network of submarine cables was viewed. With the activation of the constellations and the technical progress being made in Inter-Satellite Laser Links (ISSL), intercontinental data traffic had increasingly shifted into space. Accordingly, plans for building new submarine cables were stopped. After the 2029 attack on Cassini, how•ever, priorities were revised. The EU organised a World Cable Summit in 2030 in the hope of using fund•ing programmes to incite the private sector to make new investments in submarine cables. These initiatives turned out to be insufficient, however. No new cable projects were attempted until 2035.

The EU Commission therefore had to find other ways of raising the resilience of the Internet's infra-structure. In 2027 it started a public-private partnership (PPP), with governments and business from Europe and Africa working together on emergency mobile phone networks. Among other things, the PPP adopted technological ideas developed by Project Loon, a subsidiary of the US holding company Alpha•bet that was shut down in 2021. As with Project Loon, the fundamental idea is to create networks of hot air balloons that operate like traditional mobile phone networks, at only a few kilometres above ground. In the event of local outages of the terrestrial networks or even the satellite constellations, these mobile emergency networks can reach every spot in Europe and Africa within a few hours. Since 2028 five such networks have been on stand-by at any one time. They can be put into service within two hours.

Finally, EU member states have benefited from the massive investments in fibre optic connections that the EU had decided on as part of its measures to over•come the Covid-19 crisis. With the rise of the satellite constellations, these efforts were initially derided. In 2035, however, they are seen as a fundamental reason for the resilience of Europe's Internet infrastructure. Europe is the only part of the world that has blanket coverage by all three constellations *and* access to an extensive fibre optic network for 80 percent of all households.

4.3 Power in Global Internet Governance

Much has changed by 2035. But the existence of three independent constellations and the WTO rules from 2024 mean that it continues to be necessary for the international community to communicate on data transfer standards, including between the different networks. In 2026 an altercation arose between BlueStar and FreeStars after BlueStar announced its intention to modify the global protocols unilaterally. In response, the

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operators can only exceptionally apply for a licence as a local

This strengthens the position of countries to an extent. For[9] many governments a fundamental reason for agreeing to the new WTO regulations was the added possibilities it af•forded them for enforcing national legislation. In regions that only have access to BlueStar or FreeStars, however, it quickly became obvious that countries' influence over the operators was limited. For in•stance, BlueStar only provides its backbone services to[10]

local ISPs if they allow their users to access digital services from the US, which are supposed to be banned in the EU for data protection reasons. The Chinese constellation FreeStars very widely blocks access to news sources that are critical of the gov•ern•ment in Beijing.

Internet Infrastructure", *Journal of Information Policy* 7 (2017): 228–67 (232ff.); Thomas Lenschau, *Das Weltkabel•netz,* Angewandte Geographie, ser. 1, no. 1 (Halle: Gebauer-Schwetschke, 1903).

In 2025, BlueStar, FreeStars and Cassini jointly expressed their support for ICANN's role in managing the global DNS. However, at the same time all three operators also began building their own addressing systems. Therefore, by 2035 the DNS root zone system has changed quite fundamentally: it no longer direct•ly links to the registries of top-level-domains (TLDs) but to the registries of the three operators. The operators coordinate the use of TLDs, but they also reserve the right to block specific TLDs within their system.

This is not the only possibility for constellation operators to control the data flows within and be•tween their networks. To exchange data between the constellations, Planetary Exchange Points (PXPs) have been installed in Europe, China, Russia and the US – as well as in space. Especially at these PXPs, the three operators can decide in great detail which informa•tion may leave or enter their network.

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4See **https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.**

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Ibid.**6**"International Radiotelegraph Conference (Berlin, 1906)", *International Telecommunication Union* (online), **https://www. itu.int/en/history/Pages/RadioConferences.aspx?conf=4.36** (accessed 11 December 2020).

SECURED DATA RETRIEVAL FROM CLOUD USING TRANSFER LEARNING

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ABSTRACT:

As a result of the growth of the Internet the Web applications are now prevalent in daily life. Thus, there are more incidents that take use of online application vulnerabilities. These instances frequently involve SQL injection (SQLi) attacks, which pose a major security risk to databases containing potentially sensitive data. Retrieving of outsourced data from the cloud storage is a challenging task. In which the most dangerous security threats during data retrieval is SQLi attack. SQLi attack is a technique used to exploit user data by injecting crafted strings along with SQL queries. By inserting prepared strings along with SQL queries, the SQLi are used by malicious users to control web applications. Particularly in blind SQLi attacks, the hacker transmits malicious payloads, then uses the web application response to reconstruct the database server structure, leading to webpage vulnerabilities. During the data retrieval process, it is difficult to distinguish various SQLi attack in user query using a single window. To address this above issue, this paper presents secured data retrieval from large scale distributed database (cloud) using transfer learning. Transfer learning (TL) is a machine learning technique that focuses on preserving the knowledge acquired while resolving a particular problem and applying it to another problem that is related to it. The transfer learning model in the proposed scheme detects SQL blind injection attacks when they pass an unusual query with ancillary commands and also distinguishes the other injection attack like joint query and error injection etc., from user query in the large-scale distributed database. The experimental results further demonstrate that the proposed work outperforms the existing methods during SQLi attack detection.

Keywords: Cloud storage, blind SQLi attack, Machine Learning, Transfer learning.

According to the OWASP, Structured Query Language (SQL) Injection continues to be one of the world's top 10 security vulnerabilities [1]. SQLi is a technique used to exploit user data through malicious query inputs by injecting SQL commands [2-4]. Basically, these statements can be used to manipulate the application's database by malicious users. Example: SELECT * from STUDENT where STUDENT-ID == 122345 or 1 = 1. There are many types of SQLi attacks it includes boolean blind injection, time based blind injection, error injection attack, joint query etc., In boolean blind injection attack, the database schema is guessed by gathering responses on basis of true/false questions. Attackers injects query to discover the vulnerabilities and check if there is input validation or not. The Time-based blind injection relies on the database, pausing for a specified amount of time, then returning the results, indicating successful SQL query executing. Whereas in Error-based SQLi attack (In-band injection), the error output from the database is used to manipulate the data inside the database. Joint query injection is a kind of echo injection. i.e., There must be an echo position on the page. The position where the data is displayed is called the echo position [5-8]. So, using these attacks, attackers can steal sensitive user details, including login credentials, credit card numbers, and other personal information. It allows the attackers to impose as the user and they can make payments and take action in his / her name. The attackers can read, add, update, alter, or delete the data or tables from the site database or execute an

I. INTRODUCTION

administrative command. Through SQLi, one can gain complete control over the web applications/operating system of the server [9-12]. The proposed system leverages transfer learning techniques in order to detect these breaches during the data retrieval process without being limited to only detecting a single attack. Transfer learning is a machine learning technique that focuses on preserving the knowledge acquired while resolving a particular problem and applying it to another problem that is related to it. The knowledge gained during the prediction of one kind of SQLi attack is transferred to detect other injection attacks from user query.

The remaining section of the paper is organized as follows: Section 2 summarizes the related work and problem statement. Section 3 describes the proposed architecture. Section 4 illustrates the SQLi attack detection technique. The performance evaluation of proposed model is shown in Section 5 and finally draws conclusions at Section 6.

II. RELATED WORK

The proposed secured data retrieval technique has been developed with analysis of issues in SQLi detection techniques. The integrated model to prevent SQLi attacks in [2] reflected cross site scripting attack in PHP based implementation in web environment. The middle-ware-based prevention mechanism SQLIMW inn [3] avoids SQLi attack from the programmer to the server, and use HASH function to replace encryption and the framework developed in the paper [4] is to handle tautology based SQLi Attacks

using post-deployment monitoring technique which is not strong enough to identify the malicious query. The authors of [4,5] developed a framework for the development of runtime monitors to accomplish post-deployment monitoring of software to detect and prevent SQLi attacks which is post deployment process and causes many malicious queries to execute. The authentication scheme for preventing SQLi attack using Hybrid Encryption algorithm (PSQLIA-HBE) in [6] and TransSQL in [7] checks the difference in responses between a SQL database and blocks SQLi attacks. The SQLi detection scheme in [8] reconstruct SQLi attacks in order to maintain application integrity and [9] proposes a simple and effective SQL Query removal method. Candid technique proposed in

[10] for mining programmer intended queries by dynamically evaluating benign candidate inputs. This mechanism is theoretically well founded and is based on inferring intended queries by considering the symbolic query computed on a program runtime. The obfuscation/ deobfuscation technique in [11] to detect the presence of possible SQLi Attacks (SQLIA) in a query before submitting it to a database which combines static and dynamic analysis which is time consuming. Detection of SQLi attack scheme in [12] furnishes an idea about the detection of various SQL injection attacks with single technique. Moving with this direction, this research work has been initiated.
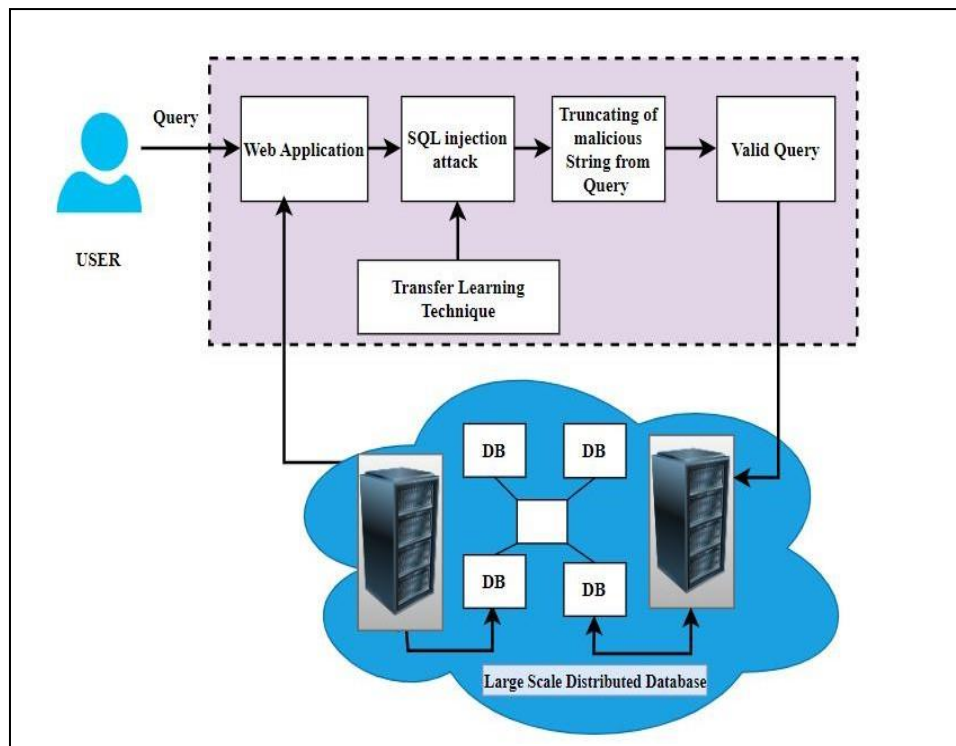
Figure 1. Proposed Architecture

III.   PROPOSED ARCHITECTURE

The architecture of the proposed work is described in the Figure 1. When the user

passes the query to retrieve data from the database in the web application, the SQLi

attack detection mechanism is applied to the query. The transfer learning technique embedded in the proposed architecture detects different types of attacks based on the knowledge it gained from transfer learning. When the model detects the query is malicious, it truncates the malicious string from the query, then sends a valid query to the database and retrieves the desired data.

IV.   SQL INJECTION ATTACK DETECTION TECHNIQUE

SQLi continues to run the application which does not return the results of the SQL query or the details of any database errors within its responses. Blind vulnerabilities can still be exploited to access unauthorized data. Depending on the nature of the vulnerability and the database involved, the techniques like injection of Boolean logic, time delay and error injection are used to exploit blind SQLi vulnerabilities. This section proposes a novel methodology to detect exploitations of SQLi vulnerabilities. The new approach utilizes security specifications that describe the intended syntactic structure of SQLi statements. At initial phase, specifications are carried out with set of rules that describes the expected structure of SQL statements in the query. The rule which defines syntactic structure in the SQL statement is expected to be executed at the back-end database. The traffic between the web application server and the data server is filtered. The SQL statements that are sent by the user

are not transmitted directly for execution to the database. Instead, each SQL statement passes through a validation process that checks it for the potential existence of SQLi poisoning attacks. The proposed system consists of mainly three main functions *viz:* Extraction, Training and Detection. The access log is extracted and separated into test set and training set and the training set undergoes learning process by the detector. The result obtained for boolean blind attack is used to detect other injection attacks. Each intercepted SQL statement initially is recognized as an arbitrary set of characters. The arbitrary input passes through a lexical analysis process in which the characters are grouped into tokens (i.e., logic units). Each token consists of one or more characters representing key-words of SQL language (eg. SELECT, DELETE, OR, AND), symbols (eg. +, -, <, <=), constants (eg. 123, 3.1416), variables, etc., An SQL statement is considered to be valid if it does not violate the syntactical rules that exist in the corresponding specification. Once the query is detected as malicious, the validation process is carried out. Finally, the valid query is passed to the database for retrieval of data from cloud storage.

V.   EXPERIMENT RESULTS AND DISCUSSIONS

The dataset is collected from Damn Vulnerability Web Application (DVWA) (Jan. 2022) which contains the access log files and converts it into 10 sets of signatures as k- fold cross validation. The nine out of ten (9/10) signature sets of benign and malicious log undergo the training phase for benign and malicious signatures. The remaining set (1/10) is

used in the testing phase. The trained features will be the scanner to be detected against the test set. The trained feature of boolean blind injection attack is used to detect error injection, joint query and time-based injection attacks in the user query.

The Figure 2 represents the results obtained by the proposed model and it has been proved that the proposed method outperforms the existing method in terms of F1score, Recall, Precision and accuracy.
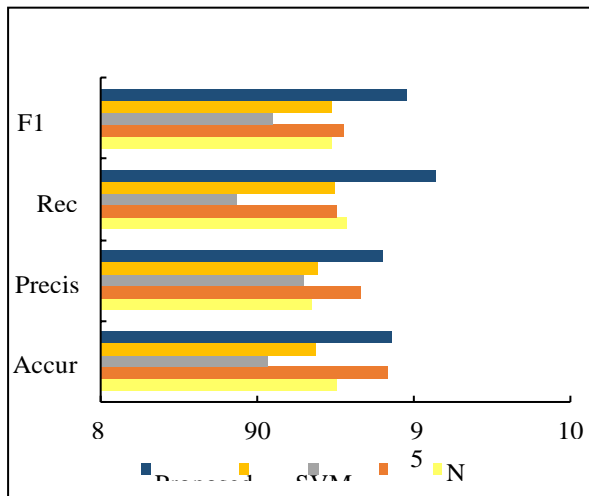
Figure 2. Proposed Architecture

VI. CONCLUSION

Detection and prevention of SQLi attacks are part of query validation. The proposed novel method detects SQLi attacks and also validates the user query during data retrieval in large scale database. This proposed work prevents the malicious query from taking control of a large database. Thus, the objective of protecting the data both at rest and while it is in motion is accomplished. Consequently, the proposed security system protects the huge data accommodated in the large-scale distributed database (cloud) against malicious user in its whole.

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Simulation of the Internet of Things

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Abstract— The two most prominent wireless technologies for building a full smart envir onment for the Internet of Things are Radio Frequency IDentification (RFID) and Wireless Sensor Networks (WSN) (IoT).For security, use simple cryptography. Security in terms of discretion, honesty,availability, authorisation, and authentication. One of the main issues is key management.use the limit of agreement and efficient error prediction for the anomaly score. This job ensures cryptographic availability and property in the integrated RFID-WSN network detection system for networks with 50–5000 nodes through anomaly ratings

I. INTRODUCTION

The Internet will soon have a record number of connected devices. In order to provide new services in smart cities and territories generally, a variety of sensors and mobile user terminals are built to communicate. In the so-called Internet of Things (IoT), these devices have ext remely specialised features in terms of hardware (many times, these devices have very little memory and processing power), software (certain OSes), and management (litt le or no administration utilit ies, few system updates). Understanding and simulating the Internet of Things will soon be necessary. It is challenging to develop and manage the intricate networks created by the interaction of IoT devices.The modeling of a general IoT environment to build effective and smart services can be quite difficult, due to the heterogeneous possible scenarios. Thus, IoT simulation is necessary for both quantitative and qualitative aspects. To name a few issues: capacity planning, what-if simulation and analysis, proactive management and support for many specific security-related evaluations. The scale of the IoT is the main problem in the usage of existing simulation tools. Traditional

When it comes to the number of nodes (and level of information) needed by the IoT, techniques (that are single CPU-based) frequently fail to scale.

This paper's major objective is to describe the key elements of IoT simulation while discussing a novel approach to increase scalability and enable real-time execution of densely populated IoT settings (e.g., large-scale s mart cit ies). As an

illustration, consider multi-level modelling and simulation, self-clustering, adaptive computational and communication loadbalancing, and parallel and distributed simulation.

This paper's major objective is to describe the key elements of IoT simulation while discussing a novel approach to increase scalability and enable real-time execution of densely populated IoT settings (e.g., large-scale s mart cit ies). As an illustration, consider multi-level modelling and simulation, self-clustering, adaptive computational and communication loadbalancing, and parallel and distributed simulation.

The rest of this essay is structured as follows. IoT/Smart-Territories background in formation and simulation techniques are covered in Section II. The state of the art for IoT simulation is covered in Section III. The proposed approach, based on adaptive parallel/distributed simulation and multilayer simulation, is discussed in Section IV. This method is used in Section V on a case study involving "smart shires." A few closing notes are included in Section VI.

II. BACKGROUND

(i). Internet of Things and Smart-Territories

The design of unique services developed by connecting multiple heterogeneous devices deployed in different geographic locations is a significant trend, as was earlier highlighted [43]. Data gathered and distributed by an information processing system, considered as open data, and controlled by a context-a ware data distribution service can be used by applications using the sensors' devices [6].

In terms of price, sensors are affordable. Therefore, both densely inhabited places and more decentralised locations can accommodate their widespread implementation [18]. A sensor network can be created by connecting these sensors together. Such data collected via this network can then be transmitted to services set up within cloud (or fog) computer infrastructures . Such data can be combined with crowdsourced and crowdsensed data coming from mobile terminals using these intelligent services. Sensing as a Service (SaaS) is the term used to describe the method of utilising any type of information obtained from the local "cloud of things" [30], [35], [41].

Effective simulation tools are required, according to the complexity of the potential outcomes of this image. These modelling tools must incorporate challenges with complicated networks, characteristics of pervasive computing, and low-level features of wireless communications. In the parts that follow, we'll talk about tried-and-true techniques and workable plans for scaling up simulations without oversimplification or inaccurate results from a lack of detail.

(ii). Discrete Event Simulation

A process simulates the behaviour of another system over time in a computer simulation [21]. Sometimes the simulated system is actual, but more frequently it is still being built or being put into practise. In actuality, simulation refers to strategies and techniques required for complex system performance evaluation..

Simulation is used for a variety of reasons. Cost considerations, the hazard of testing on a live system, and the need to assess a variety of alternatives in order to assist system design are a few examples (i.e. dimensioning and tuning). Simulation is employed more and more frequently as a result of the complexity of the systems that need to be constructed.

One of the various simulation paradigms considered is discrete event simulation (DES) [34]. In comparison to other methods, it is quite user-friendly and has good expressiveness. A simulated model of a DES and its evolution are each represented by a set of state variables (that is represented by a sequence of events processed in chronological order). Each event takes place at a specific moment in time and denotes a change in the state of the simulated model. This indicates that the entire evolution of the simulated system is gained through the execution of a predetermined sequence of created, stored, and processed events. . For instance, updates to the positions of the cars and the transmission of data packets are events in the simulation of vehicular ad hoc networks. A DES is a set of state variables (i.e., characterising the modelled system), an event list (i.e., the pending events that will be processed for evolving the simulated state), and a global clock (i.e., the simulation time) at its most basic [34]. Each event has a timestamp attached to it that indicates the simulated time it must be processed at.

A single Physical Execution Unit (PEU), such as a CPU core, is responsible for creating new events, maintaining the list of waiting events, and processing the events in timestamp order in a sequential (i.e. monolithic) simulation. In other words, the entire simulated model and its evolution are managed by a single CPU core. Although this strategy is straightforward and simple to apply, it has significant disadvantages. The ability to scale simulations both in terms of execution time (to finish the simulation runs) and the size of the system that can be represented are a few examples [15].

(iii). Parallel DES and PADS

As an alternative, a group of connected PEUs can be used to parallelize the aforementioned operations (e.g. CPU cores, CPUs or hosts). Parallel Discrete Event Simulation (PDES) is the name of this strategy [22]. Since each PEU is only in responsible of a portion of the simulation model, very big and complex models can be represented and executed in this situation. In other words, each PEU keeps track of a local list of pending events, and some events are sent via messages to distant PEUs. In order to ensure proper simulation execution, the PEUs must also run a synchronisation mechanis m. A PDES technique can often speed up the simulation run, but at the expense of a more sophisticated simulator implementation and setup.

A simulation that uses many processors is known as a parallel and distributed simulation (PADS) [42]. The e xecution speed, model scalability, interoperability, and composability goals (e.g., to integrate many off-the-shelf simulators and to combine numerous already existing simulation models in a new simulator) [21] are only a few solid reasons to rely on this technique.

A global model state is absent in a PADS as compared to a monolithic simulation. In other words, one instance of the simulated model is absent. In actuality, just a portion of the simulated model is managed by each PEU in the PADS. The model elements that are run on top of each PEU are referred to as Logical Processes (LPs) in accordance with the PADS terminology [12]. The interaction of LPs, each of which deals with the evolution of a specific aspect of the simulated model and interacts with the other LPs (for synchronisation and data distribution), results in a PADS, as depicted in Figure 1 [21].

The PADS architecture and simulator execution speed are significantly impacted by the network's ability to interconnect the LPs. Parallel simulation is when the LPs are e xecuted on PEUs connected by a shared memory. Contrarily, distributed simulation refers to loosely connected LPs. The e xecution architecture for PADS is frequently a hybrid of parallel and distributed PEUs [14]. The primary concerns in a PADS are, in brief:

> • a collection of LPs are used to partition the simulated model [50]. The partitioning is a difficult task because it must take into account both the load balancing in the parallel/distributed execution architecture and the

minimization of network communication (among LPs);
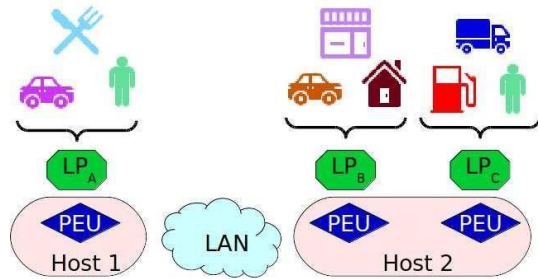• the results from the PADS are only accurate if they exactly match those from the sequential simulator.

Fig. 1. Parallel and Distributed Simulation: model partitioning.

This is only possible if a synchronisation method is in place to properly coordinate the evolution of the LPs;

• each LP creates updates (events) that may be pertinent for various aspects of the simulated model in other LPs. It is not possible to broadcast every event due to performance issues. Data distribution, which focuses on the effective delivery of state updates, frequently uses a publish-subscribe methodology [27].

Encapsulating the events in messages for their conveyance between LPs allows for the implementation of a PDES utilising PADS. Two occurrences are in causal order, according to Lamport's definition, if one of them can have an impact on the other. It is obvious that the causal order of events must be followed in order for the simulation to run correctly. This is simple in a monolithic simulation, but complicated in parallel and distributed architectures since each PEU executes at a different speed and there are delays in the network. The LPs in a PADS must run a synchronisation algorithm to ensure that all events are executed in non-decreasing timestamp order. There are other ways to handle the synchronisation, but the following are the basic methods:*time-stepped*: the simulated time is divided in timesteps of fixed-size. The simulation model is updated at every timestep and the lower bound to the flight time for interactions between the model components is the size of the timestep. When a LP completes the tasks for the current timestep, it broadcasts to all the other LPs an End-Of-Step (EOS) message and then waits the EOS messages from all other LPs before proceeding to the next timestep [47];

• *conservative*: The causality errors are avoided in this method. To put it another way, each event is evaluated to see if it is "safe" before processing it (with respect to the causality constraint). The event can be processed if the synchronisation algorithm has classified it as safe. If not, the LP must halt processing while it waits for additional events (or better information about the safety of events). The Chandy-Misra-Briant [40] algorithm is one of many that can be used to do this safety check;

• *optimistic*: In this instance, the LPs handle the events in receiving order. This implies that the causality order will most likely be broken. In fact, the LP that discovered the violation implements a roll-back to the (most recent) previous state that is right when the synchronisation algorithm detects a violation. Additionally, it propagates the roll-back to all other LPs impacted by the violation [26]. By doing this, the entire PADS returns to the most recent globally accurate simulation state and restarts the event processing.

(iv). Adaptive PADS

As previously said, partitioning the simulated model in PADS is a difficult process. [14] outlines a method in which a multi-agent system stands in for the simulated model. Simulated Entities, or SEs, are the little model components that make up the simulated model, and it is via their interchange and interaction that the model evolves. In this fashion, LPs function as containers for SEs, and a SE can be moved (migrated) from one LP to another. This enables improved computational and communication load balancing by avoiding the static division of the simulated model and allowing for flexible reallocation of the SEs. This frequently resulted in accelerated simulation execution and improved scalability.

The GAIA/ART'IS simulator [5] uses this adaptive PADS technique, which is currently based on time-stepped synchronisation. This serves as the foundation for the multi-level modelling approach that we suggest using to simulate IoT models, as explained in the following section of this study

.III. STATE OF THE ART

(i). Simulation of the Internet of Things

Large-scale testbeds or the use of scalable simulation tools are required for the creation of complicated IoT setups. The number of nodes in the simulation scenario and the level of detail required by the interaction between nodes are crucial factors for the simulator's scalability.

In [24], the authors explore several disadvantages of simulation-based methods, outline the criteria for the future generation of IoT experimental facilities, and conduct a study of current testbeds (some of them also supporting cosimulation). Although a federation of testbeds -based strategy is conceivable, it has significant disadvantages. Although an on-site simulation is frequently chosen, the scale and level of information required by IoT models cannot be met by the current network simulators.

SimIoT is a novel simulator that is detailed in [46], and for improved performance, the back-end operations are carried out in a cloud environment. The use case outlined in the paper is a health monitoring system for emergency scenarios where patients' health is monitored using short-range and wireless communication devices. The initial performance assessment is based on 160 identical tasks that 16 IoT devices submitted.

I [36] takes into account the large scale of many IoT projects. In this instance, the authors offer an overview of large-scale simulators and emulators before proposing MAMMotH, a software architecture built on emulation. As far as we are aware, MAMMotH's development ceased in 2013.

For the purpose of studying expansive IoT scenarios in urban settings, Brambilla et al. integrate the general-purpose discrete event simulation DEUS with the domain-specific simulators Cooja and ns-3 [10]. The performance assessment in this case is based on six scenarios that each contain up to 200000 sensors, 400 hubs, and 25000 vehicles. The scalability of the execution time in relation to the amount of events is fairly good. To the best of my knowledge, the DEUS simulator, on the other hand, has a monolithic design and is implemented in Java.

An IoT-based smart home system with performance evaluation based on various simulation techniques, such as Monte Carlo, is proposed by the authors in [45].

The OASIS standard "Devices Profile for Web Services" (DPW S) is supported by the simulation toolkit known as DPWSim [25]. Its primary objective is to offer a cross - platform and user-friendly evaluation of DPWS devices and protocols. It is not intended for really large-scale systems, in other words.

According to the methodology used in [11], the IoT scenario is described using a model-driven simulation that is built on the SDL standard language. An automatic code generation process uses this as a starting point to convert the description into an executable simulation model for the ns-3 network simulator.

Finally, [31] makes a fascinating suggestion. The author suggests a hybrid simulation environment in which a domain-specific network simulator (OMNeT++) is coupled with Cooja-based simulations (i.e., system level simulations).

(ii). Internet of Things and Smart-Territories

There are several needs for the simulation tool to meet when it comes to the use of IoT to develop effective services for creating "smarter" regions. Scalability is the primary problem, both in terms of the quantity of modelled entities and the level of detail in events. A smart territory of any size will contain thousands of connected devices. They will all have extremely particular behaviour patterns and technical qualities, and many of them will be mobile [18]. The simulator should be able to run in (nearly) real-time, at the very least with average size model instances, if a proactive approach is required (e.g. simulation in the loop) to do "what-if analysis" during the management of the deployed architecture.

We contend that a realistic IoT model must be used in a multi-level simulation in order to simulate a smart territory scenario. In actuality, it is impossible to run the entire model at the greatest level of detail. A preferable strategy is to connect various simulators, each of which operates at the right

level of detail and includes particulars of the domain being simulated (such as mobility models, wireless/wired communications, and so on). In the part after this, we will go over this strategy.

For modelling urban processes in general, agent-based simulation is the ideal instrument [28]. Cellular automata, land-use transport interaction models, and agent-based simulation are all suitable in planning support systems. These models can be used on a variety of time scales, from short-term modelling to long-term models for examining change through strategic planning, such as diurnal patterns in cities. Mobile users of automobiles, for example, are examples of moving entities that can be simulated using tools like MASON [37] and SUMO [32]. These methods have been effectively used to research intelligent traffic control systems [7], [29], [48], [51], crowdsensed mobile applications [44], and other topics. The primary issue with these methods is that, by their very nature, they preclude the creation of large-scale scenarios with numerous linkages.

CupCarbon is a multi-agent and discrete event simulator for smart cities and the Internet of Things (SCIWSN) [39]. It enables the creation, visualisation, and verification of distributed algorithms within a network. Direct sensor deployment on the map is accomplished using the OpenStreetMap framework. This tool's main objective is to assist instructors in explaining the fundamental principles of sensor networks and how they operate. It can also assist researchers in testing wireless topologies, protocols, etc. The fundamental issue with scalability is still present.

A number of image and 3D based simulators, like Can Vis, Second Life, Suicidator City Generator, and Blended Cities, are also worth mentioning. UrbanSim is one of them, a software-based simulation for urban regions with tools for analysing how land use, transportation, and policy interact [4]. It is designed to be used by Metropolitan Planning Organizations and others who need to connect new land use forecasting and analysis tools with current transport model interfaces. Unlike the majority of these tools, UrbanSim focuses on analysing the effects of various situations on urban communities rather than developing scenarios.

IV. MULTI-LEVEL SIMULATION

The use of fine-grained simulation models causes scaling issues in the performance evaluation because many IoT models are made up of a very large number of nodes. In other words, a monolithic simulator that incorporates a fine-grained degree of detail and manages all the IoT nodes is impossible to deliver the simulation results in a reasonable amount of time. Massively crowded installations are challenging to manage even with a PADS strategy. Reducing the level of complexity in the simulation model or using High Performance

Computing execution platforms are two ways to get around this.

We suggest a multi-level modelling and simulation strategy [23] for large-scale IoT systems because of these reasons..
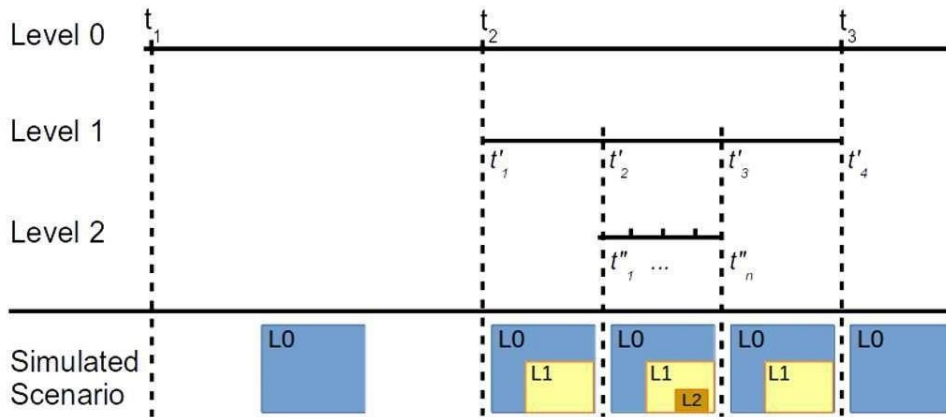

Fig. 2. Multi-level simulation.

This refers to a "high level" adaptive PADS simulator (i.e. GA IA/ART'IS) that operates at a coarse grained level of detail and manages the execution of a number of domain-specific "middle" or "low level" simulators that are only used when a fine grained level of detail is required (e.g. OMNeT++ [2], ns-3 [1], SUMO [3]). The simulation modeller has the option of manually switching between coarse and fine grained models or automating the process. For instance, a thorough simulation model could evaluate network capacity or congestion issues if a particular simulated area is overpopulated with wireless devices. The compatibility across the simu lators and the design of the inter-model interactions (such as synchronisation and state e xchanges at runtime between model components) are the key problems with this multi-level method.

More particular, as depicted in Figure 2, the entire scenario is run at level 0 during the simulation bootstrap (that is, with a minimal details). Therefore, using a time -stepped synchronisation technique, the high level simulator (such as GA IA/ART'IS) controls the evolution of all model components and their interactions [9]. It is discovered at timestep t2 that a portion of the simulated scenario (such as a particular zone in the simulated region or a particular group of modelled nodes) needs to be more thoroughly simulated. As a result, in the figure, some of the simulated region is still represented by level 0 modelling, but a certain zone is now controlled by level 1 modelling. If necessary, a level 2 model can be used to further detail a particular area in the simulation's subsequent stages (and simulator). Since there are only two levels in this discussion, all model components controlled by the level 0 simulator are evolved using t -sized timesteps, while all other levels utilise t′-sized t imesteps. A portion of the model's components are transferred from the coarse-grained simulator to the finer one at t imestep t2 (which is the same as for level 1). The level 0 components will leap

from t2 to t3 in the ne xt step, while the level 1 components will be updated at and (which is the same as t3 for level 0). However, since this level of detail is no longer required, all of the level 1 components are then transferred back to the level 0 simulator. All interactions between level 0 simulated components may occur at every coarse grained timestep, while interactions at level 1 may occur at every fine grained timestep, subject to the limitations imposed by the time-stepped synchronisation mechanism. Finally, only coarse-grained timesteps allow for the interaction of components handled at separate levels. In other words, when the timesteps at the various levels coincide.

This method keeps the simulator's overall node count constant while adjusting the simulation evolution's level of detail to meet the needs of the simulation model as it runs. In other words, this indicates that the simulation model is not run continuously at the most basic degree of detail. As a result, compared to classic simulation methods (monolithic or PADS), it is possible to achieve a superior scalability. On the other hand, it is evident that any type of model approximation, including multi-level modelling, incorporates some degree of error into every analysis. The right procedures for verification and validation must be utilised, just like in every simulation.

As of this writing, we are completing the multi-level simulator's architecture and working on a prototype implementation that incorporates the case study covered in the following section [18, 19].

V. CASE STUDY

We exa mine a primary use case including the requirement to offer smart services to territories, be they cities or more dispersed areas, as an application scenario. We pay special attention to "smart shires," a novel concept for decentralised geographic areas that can manage resources (natural, human, equipment, buildings, and infrastructure) in a way that is sustainable and doesn't hurt the environment [18], [19]. The goal is to develop new, cost-effective services that can be quickly deployed without the need of expensive infrastructures and that will enhance the quality of life for locals and visitors.

The usage of crowdsourced and crowdsensed data from the IoT is required for affordable solutions. In terms of price,

sensors are affordable. They can therefore be deployed in a rural area. Through the use of clever communication techniques, these sensors must be connected [43]. A distributed information processing system controls the data sensed by the sensors' devices, enabling context-a ware data delivery [8].

There are many potential application scenarios, including proximity-based applications (such as proximity-based social networking, bystander advertising, intelligent vehicle communication, etc.), support for security and public safety, services related to the supply chain in rural areas (such as smart agriculture and s mart animal farming), and intelligent traffic management systems..

As an exa mple of a specific use-case, the "km 0" phenomena has recently attracted a lot of attention in Italian and European gourmet circles. This acronym for "zero kilometres" denotes locally sourced, minimally impactful primary food items. To increase the quality of the offered products and encourage sustainable cooking, the objective is to prioritise the use of locally sourced and seasonally appropriate ingredients while avoiding the use of genetically modified organis ms. Despite the rising popularity of locally produced goods, there are still relatively few locations where one may purchase them directly from the manufacturer. Customers must therefore search for specialty weekend farmer's markets or farm direct sales. Customers may include lone consumers, ethical buying groups, and restaurant proprietors. And frequently, this product's research shows that it's not always an easy process for customers. As a result, cleverer possibilities are feasible.

Consider a service that enables customers to sign up to receive notifications when a specific product becomes available. When a producer (for example, a farmer) has such a commodity available, he can publish a notification that can alert subscribers of product availability as well as other relevant in formation, such as, for e xa mple, his appearance in upcoming markets or other potential buying opportunities. The customer can make plans to visit the market (so they can choose the products themselves), reserve certain items, quantities, and so on in light of such information. So far, everything are going well. There are many publish-subscribe techniques that could support these producer/consumer interactions and the creation of smarter services. However, more advanced services are also conceivable. Customers may need to be guided to the actual location of the producer, which is dynamically calculated, because there may be several (seemingly similar) producers in the market, they may not know the location, and they may have some physical impairments (hence, without the possibility of knowing the position in advance). Once there, he might be curious to look around for any further intriguing products.

Due to proximity-based services that could direct clients in a wise and efficient market tour, producers are able to instantly provide information in order to address these concerns. These services can be used in various ways depending on the technologies that are now accessible on the market. For instance, all communications may go through a wireless network if one were to be made available. If not, some sort of ad hoc solution should be dynamically created by manufacturers that take advantage of their smart devices (like smartphones) to create multihop wireless connection and information dissemination techniques. [19Additionally, seamless communication solutions should be used in cases of intermittent connections. One such strategy is multihoming [20]. Such message dissemination may be successfully carried out using some type of epidemic dissemination protocol over a dynamic, opportunistic ad-hoc overlay, used in conjunction with application filtering techniques because it includes advertisements, general market in formation, and publish messages looking for their subscribers [16], [17], [49].

It is difficult to effectively simulate such a broad situation in a smart area since it comprises a number of actions that span multiple distinct domains and necessitate varying degrees of granularity. Multi-level simulation may be relevant in this situation. Figure 3 illustrates the various granularity levels that can be imagined. The coarse level (level 0), which mimics the entire smart territory, shows how many actors make items, subscribe to their interests, and move toward various geographic regions. This can be carried out using a traditional agent-based simulator, possibly with PADS capabilities [13].

In order to take into account wireless communication concerns, fine-grained interactions, and movements, more simulation details (and likely a new simulator) are required as it becomes necessary to mimic the precise interactions inside a given region (such as the "smart market"). As a result, a more in-depth simulation level (based on a domain-specific simulator) is in itiated (i.e. level 1 in the figure). Each simulation step of the coarse-grained simulation layer in this instance (such as stages t3, t4 of level 0 in Figure 3) is divided into several substeps at the fine-grained layer (level 1). By using this method, the level 1 simulator can inform level 0 of simulation developments.
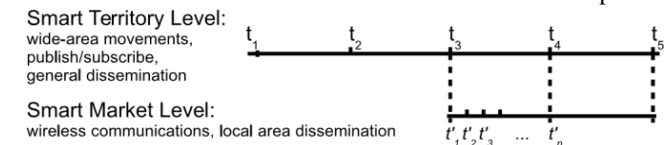

Fig. 3. Smart Territory/Market multilevel simulation.

VI. CONCLUSIONS

In this study, we discussed the key challenges that must be overcome when simulating the Internet of Things. The two main, and frequently at odds with one another, objectives are scalability and high degree of detail. The use of adaptive, agent-based, parallel and distributed simulation (PADS), in conjunction with multilevel simulation, is a good method to utilise in this context, we concluded after reviewing various existing techniques.

The use case analysis demonstrates that multi-level simulation techniques offer ways to model large geographic areas with a variety of simulation entities. The use case is connected to the design of smart services for smart cities and decentralised areas (agents). But when necessary, it is possible to start a more in-depth, fine-grained simulation to take into account factors that would be impossible to replicate otherwise. The intriguing feature of this method is that the detailed simulation, which is more expensive, can be run only for the duration of the simulation in a specified, constrained simulation area.

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SMART ENERGY METERING

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ABSTRACT:

Smartmeteringisathemethatasoflatehasdrawn in much consideration. Brilliant meteringguarantees many advantages and undertakings inEurope, the USA and different nations show thatshrewdmeteringisinfactachievable.Mainpressing concerns are the genuine worth of theadvantages,theexpenseinquestionandthedissemination of cost and advantages of brilliantmeteringbetweenmarketpartiesincluded. Ahighlevelmeteringfoundationofferstheopportunitiesforextraenergyrelated

administrations,forexample,requestsideadministrationandacknowledgmentofvirtualpowerplants.The eventualfateofsavvymeteringwillrelyintenselyuponthearrangementandconclusivenessoftheadministrativebodiesincluded.Energyreservefunds and an expanded security of supply will beprincipaldriversandhavefaithinshrewdmetering as a way to arrive at these objectives isessential.

INTRODUCTION:

Smart metering is no doubt a point that as oflatehasdrawninmuchconsideration.Numerous nations inside the EU and outsideareasofnowengagedwithprojectswithbrilliantmeteringonanexhibitscaleorbigger.
Various advantages are for the mostpart ascribed to smart meters and these willbe talkedaboutexhaustively inthispaper.

Many inquiries emerge, regardless of whetherwe centrearound shrewd metering for powerutilizeasitwere.Whatarethespecificelements of shrewd meters and what are theadvantages?Whatisthesituationwiththeinnovation?Whichsavvymeteringprojectsarecompletedrightnow?Whatarethe(middle of the road) consequences of theseundertakings?Aretherereanyhindrancesforexecutionalso,whatistheideaoftheseboundaries (specialized,
affordable,hierarchical)?Whatistheprojectedfutureandeffectofsavvymetering ?

Thispaperwilldirectyouthroughtheseinquiries and give you understanding into thestatus and eventual fate of brilliant metering.Thispaperwillzeroinonpowermetersin Europe, yet, will likewise consolidate resultsfromsignificanttasksoutofEurope.Itwillfinish up with a general view on the fate ofsmartmetering.

Smartmeters,whatdotheydo?

Smart metering for the most part includes theestablishmentofasmartmeteratprivateclients and the customary perusing, handlingandinputofutilizationinformationtothe client.A"brilliant"meterhastheaccompanyingcapacities:

• Ongoing or close time enlistment of poweruseandconceivablypowercreatedlocallye. g.,ifthereshouldbeanoccurrenceofphotovoltaiccells;

• Offering the likelihood to peruse the meterbothlocallyandfromadistance (onrequest);

• Distant limit of the throughput through themeter (in the outrageous case cutting of thepowertotheclient)

• Interconnection to start based organizationsandgadgets (e.g.,conveyedage)

• Capacitytoperuseother,on-premiseorcloseby productmeters(e.g.,gas,water).

Typically,asmartmeterisconsideredforlibrary of power and gas use, yet additionallywaterutilizationenrolmentisplausibl e.Infigure1,anillustrationofaregularshrewdmete rfurthermore,itscapabilitiesareschematicallysh own.
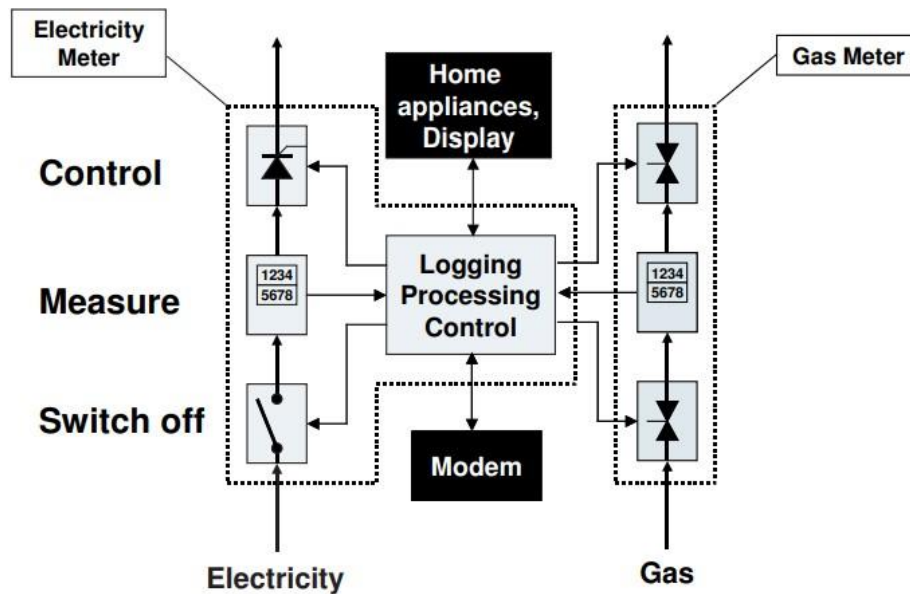
Figure 1: Schematic overview of a typical smart meter configuration [1]

The'mentalfortitude'ofthemeterisconsolidated in the power meter. It has threefundamental capabilities: measure the powerutilized(orproduced),remotelyswitchthec lientoff andremotelycontrol thegreatestpowerutilization.Thepowermeterim partsthrough a modem. A significant trademark isthecorrespondencefoundationinvolvedbythes avvymeterforthiscorrespondence.Among the potential outcomes are ElectricalcableTransporter(PLC,utilizingthecur rentpowermatrix);aremotemodem(GSMofGPR S)oracurrentsuperdurablewebassociation(ADS L).Apointofinteractioninterfaces the smart meter to home machinesorahomepresentation.Machinescanbe controlledstraightforwardlyandthepresentation canbeutilizedtoshow

(noteworthy) energy information and energycost.

 In this model a gas meter is coupled to thepowermetersandgetsthe"knowledge"further more,correspondenceofficesofthepowermeter.

Innovatively,therearenosnagsforthepresentatio nofsavvymetering.TheItaliancase(carryoutofar ound30millionsavvymetersatprivateclients)and variousexhibition projects in different nations showthat the innovation is experienced and can becarriedoutonahugescale.Abrilliantmeteris a legitimate replacement of the mechanicalpowermeter,similarlyastheget,thedi altelephone and the typewriter are supplantedwithadvanced,more cleverchoices.

BrilliantMeteringisfrequentlyalludedtoasroboti zedmeterperusing(AMR),oron

account of constant, two-way interchanges, ascuttingedgemeteringfoundation(AMI).

Advantagesofsmartmetersandparties includes:

Many benefits are ascribed to smart metering,includinglowermeteringcost,energyin vestment funds for private clients, greaterdependabilityofsupply,variableevaluatin gplanstodrawinnewclientsandsimplerlocationo fmisrepresentation.Extraadvantagesarepredicte dcorrespondingtodispersedage.Thesmartmeterc anbeutilizedtoindependentlymeasurepowercon veyed by the DG to the network and theshrewd metering correspondence frameworkcan be utilized to remotely control DG (e.g., inavirtual power plant idea).

Smartmetersofferadvantagestodifferentgathering s.Consequently,adifferentiationismadebetweenen ergyclients,frameworkorganization,meteringorga nization,providerandgovernment.Notallnationsm akeaqualificationamongframeworkandmeteringo rganization,howeverastheirundertakingsvary this paper involves the differentiation forlucidity. Advantages can be made sense of bytaking a gander at thecontrasts between theongoing circumstance with the old meter andthe future circumstance with the new meter, asdisplayedschematically.

Requestreactionbyhomegrownenergyclientsisn' tyetatypicalpractice,yetwouldbe empoweredbyshrewdmetering.Shrewdmeters are equipped for restricting or in anyevent, cutting off the energy use when set offbymarket developments. Atthepointwhenall families and little to medium undertakingsin a nation would have the option to adjusttheirenergyuseduringatimeofexcessiveco stsordecreasedaccessibility,thiswouldworkonth eunwaveringqualityofsupplyupgradeenergyma rketexchanges,energy

reserve funds, energy mindfulness and energyeffectiveness.Thesedrawnoutbenefitsofs hrewdmetersmightwelladdtoenergystrategyobj ectivesofadministrative bodies.

Onthemorelimitedterm,energyclientsbenefit from the brilliant meter as they have adirect audit plausibility of their energy use. Bychangingtheirwayofbehaving,theycanlessen their energy cost. Likewise, they mightget a last bill on month to month premise asopposedtopayinganinanycase,advance(albeit a few clients favour a decent regularlyscheduledinstalment).

The metering organization faces the test of atfirst supplanting old meters by smart meters.Atthepointwhensmartmetersareintroduc ed,thisrequiresonemoresortofactivityforinform ationassortmentandinformationcorrespondence .Asshrewdmeters present a high measure of successiveinformation streams, cycles and frameworksshouldbeadjustedandarrangedasnee dsbe.

The information assortment interaction won'trely upon clients being at home however willbeaconsistent,robotizedprocess,whichought to work on day to day activity of themeteringorganization.Atthepointwhenevery thing energy use is observed by brilliantmeters, network organizations will get a muchmoregenuineandexactoutlineofenergyutili zationintheirdistrict.Thisimpliestheycan analyse dubious regions where energy useis surprisingly high, and in this manner smartmetering will furnish network administratorswith a devicetorecognizeextortion. In themidst of power lack, the matrix administratorhasthechoicetorestrictpoweruse.A ssemblingallinformation,theframeworkadminis tratorwillactuallywanttoforesee

powerstreamsallthemorepreciselyandutilizethis informationinorganizationandupkeep arranging. The mechanization of theinformationassortmentprocess,withmore,late information on a higher recurrence, willputhighernecessitiesonframeworks.Thiswilllikewiseaffectmarketworkingwithprocesses,as compromiseofpreviouslyprofiled clients might become superfluous Tothe provider, the savvy meter offers prospectstooffer new and committed administrationsto their clients. The brilliant meter might turninto an entryway into the home of the client,tooffernewbenefitaddedadministrations. Additionally for the charging system, genuineutilizationinformationcanbeutilized,improving on the ongoing system of advancesandrecalculation.

Typicalreadinvestment fundsalludetothedecrease of immediate and roundabout meterperusing work. The work decrease alludes toextradecreaseincallcommunitywork,charging what'smore,assortmentandseparationofdefaulters.Processupgradesincorporatediminishedenergyburglary,expanded charging exactness and more tightchargingandassortment.Frameworkenhancements allude to the advantages of amore exact, computerized meter and the waythat putting in new meters in an entire regionwilldiminishthefuturemetersubstitutions pendingplan.

Smart metering cost might shift however e80forashrewdmeterande40forestablishmentaresensibleassessments.Sosmartmeteringlooksattainablehoweveritreliesuponthemonetaryappraisal made.
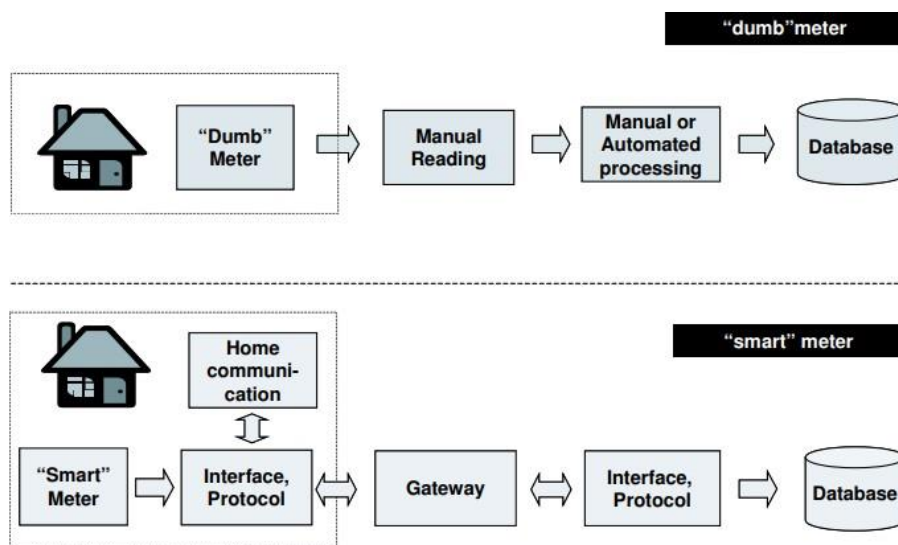
Figure 2: Difference between the conventional and the smart meter data process [1]

CurrentActivities

Thissegmentcontainsanoutlineofsmartmeter projects in Italy, Sweden, theNetherlands,theAssembledRealm, Victoria(Australia), Ontario (Canada), California (USA)furthermore,NorthernIreland.

TheItalianutilityENELpresentedbrilliantmeters currentlyin2001intheir"Telegestore

project".BeforeliberationoftheenergymarketENEL(stillasastate-claimedmonopolist)wentwiththein-organizationspeculation choice to present brilliant metersasfirstutilityaroundtheworld.SignificantexplanationsbehindENELwerethenormalreserve funds or incomes in the areas buyingandstrategies,fieldactivities,client

administrationsandincomeinsurance(extortion). The controller or government orothermarketpartieshadnoorasitwereperiphera leffectonprerequisitesENELneeded to satisfy. As to sort of meter or thecorrespondenceframeworkENELwaslefttho roughlyfree.ENELhasdecidedforashrewdpower meterthatimpartsthroughPLCtotheclosestsubst ation.Then,concentratedcontrolroomsreadthein formation through GSM. Toward thefinishof 2005, ENEL had 27 million shrewd metersintroduced,ofwhich24millionmetersareo verallremotelymadedue furthermore,everyothermonthread.

In Sweden the initial examinations into savvymeteringwerecompletedin2001.Afeworg anizations had pilot projects then, at thatpoint, yet the public authority predicted opendoorsforenergyinvestmentfundsalso,neede dtotakeadvantageoftheexpectedadvantages.By obligingthelatticeorganizationstoamonthtomon thmeterperusingforallpowerclientsby2009,thep ublic authority animated the presentation ofsavvy metering. This bill was passed in 2003.Since,interestsinshrewdmeteringhavecrea tedinaquickerratethanlegallynecessary.

IntheNetherlands,thepublicauthorityisthinking about regulation to present shrewdmetering subsequent to having led an itemized moneysavingadvantageexaminationforcrossco untry presentation of AMR . The proposedregulationoughttobecomepublicbySep tember2006.Beginningin2008,allprivateclients willgetashrewdmeter.Proposed time span for this presentation is 6years. Least necessities for these meters arepresentlybeinglaidout.Meanwhilesomepilot projectsarebeingcreated.TheDutchmatrixadmin istratorContinuonhasbegunwithapilotprojectin 2006.Some50,000brilliantmeterswillbeintrodu cedwithchosenclientsin2006toassembleinsight

withallfunctionalpartsofshrewdmeters.The shrewd meter (Metripoint) registers bothpowerandgas andconveys throughPLC.

Likewiseanotherenergyproviderandguaranteed meteringorganizationinTheNetherlands,Oxxio ,hasbegunin 2006toofferbrilliantmeterstoits clients. Oxxio decided to seek after thisdriveastheycontinuedtobegoneupagainstwit h managerial issues at their counteraccomplices.Clientswithabrilliantmeter likewisehavesectiontoanindividualsitewiththe realenergyuseandenergycosts.Oxxio'ssmart meter registers both power and gas andconveysthroughGSM/GPRS.

IntheUK,controllerOfgemhasasoflatebeeninves tigatingthecapabilityofbrilliantmeters. Driversareamongothersthepossiblecommitmen ttomeetingprerequisitesfromthe Kyotoconvention,necessitiesbytheEUEnergyA dministrationsmandate,risingenergycosts what's more, global improvements in shrewdmeters. Ofgemis as yet open toall choices,the counsel interaction will take some additionaltime. In Victoria, Australia, expanding summerpower request tops via cooling causedadditionalspeculationsonlowusepl ants. Acquaintance of brilliant meterswithclientswasviewedasaninstrum enttointerfacediscountandretailshowcase s.Thepublicauthoritychangedregulationas inducedbytheFundamental
                           Administrations Commission of Victoria. Establishment isbegunin2006fordevotedclasses,in2013 around 1,000,000 shrewd metersoughttobeintroduced.

InOntario,Canada,expandingpowerrequesttopswereadditionallythedriverfor shrewd metering.Energypreservationandrequestsideadministrationhavebecomesignificant goalsinsidetheenergystrategy.TheOntario EnergyBoardhasproposedfundamentalsmart meteringcapabilitiesandafewinsignificant specialized principles. Everyenergyorganization is free to foster its own smart meteringstructure.Targetsareestablishmentof 800.000meters toward the finish of 2007 and coveringall 4.3 million Ontario clients toward thefinishof2010.

The fundamental driver for acquaintingAMR in California is with increment theunwavering quality of power supply inthisstate,throughthedecreaseofbuyertop interest.California has alatespringtopinterestforpowerduring roughly 50 to 100 hours out ofevery year. This top is chiefly because oftherisingutilizationofforcedairsystems. TheprimaryenergyorganizationsofCalifornia consideredrequestreactiontobeasignificantcomponenttodiminishthispinnacle.All

threesignificantCaliforniautilities2fostered theirownarrangementstocarryoutAMIframeworkstoeveryprivate client. Organization plans call forintroducing every single high level meterand interchanges foundation by 2012 or2013, and address probably the biggestAMI organizationsontheplanet.Accordingly,variousmassivechangesarehappeninginAMI innovationdevelopmentandcostdecreases ,asmerchants look to catch their portion ofthis market.

The Northern Ireland Power plc.utilizedprepaymentmeters.Grievance sandfunctionalexpenseswereexpandingand required establishment of anotherframework.Thepresentationofthe' Freedom 'Credit The executives' keypadmeter' has begun starting around 2000.By2005,nearly155000metershaveb eenintroduced,covering22%ofclients.Beg inningaround2005toopreliminarieshaveb eenembracedinnewclientadministrations. Theseattention on estimating, offering variousrates in unambiguous periods, and showdecrease ofenergy usebyclients.

TheFutureofSmartMetering:

Sowhatisthefateofsmartmetering?Isitapromotion that stops after some (showing)activitiesorwillsmartmeteringbecome normalinnovationforutilitiesinsidethefollowing decade? Thereisnoquestionaboutthelikelyadvantages of shrewd metering. Smart metersshow up tobe the greatest imaginative improvementof thelastyear, andkeyforall market parties:

• formeteringorganizationstodiminishmeterunderstandingexpenses;
• forframeworkadministratorswhoneedtosetuptheir network towhat'sto come;
• forenergyproviderswhoneedtopresentnew,clientmade benefitsanddecrease callfocuscost;

• forstaterunadministrationstoarriveatenergy saving and productivity targets and toworkonfreemarket processes;
• forendclientstoincrementenergymindfulnessandreductionenergyuseandenergycost.

Presentationofbrilliantmeteringappears to be likewise a sensible movetowardarealitywhereallcorresponde nceisdigitalizedandnormalized (Web, Email, SMS, talk boxesandsoon)andwherecostof'computeri zedinsight'arestillquicklydiminishing.

Inaddition,ahighlevelmeteringfoundation offers something other thanperusing and controlling shrewd meters.It tends tobeviewed as a committedpassagetotheclientshome,offer ingextra energy related administrations. Ittendstobeutilizedbothforrequestreaction (invigorate the client to changehisenergyconduct)andrequestside administration(directcontrolofdomesticd evices,forexample,theclotheswasherorthe climatecontrolsystem). In connection to nearby age ofpower(miniatureCHP),itoffersthelikeli hood to understand a virtual powerplant.

Notwithstanding,twosignificantissuesha mpertheoverallpresentationofshrewdmet ering.Rightoffthebat,there are many gatherings included, andthe advantages of savvy metering maybuild to other parties than the ones thatbearthe expenses.Furthermore,thereisstillalotofv ulnerabilityabouttheevaluation of the advantages as usefulexperienceandverifiableinformatio naredeficient.

Accordingly,interestsinbrilliantmetering implies facing challenges. In achanged market,
these dangers are weighted cautiously.In a managed market there are much ofthetimenomotivatingforcestofacechalle nges. This occasionally prompts astalemateintheenergymarket.Rightnow,t hemethodforgettingthroughthisstalematei sbysetting

(inter)nationalprinciplesfurthermore,taki ng on suitable public or potentiallyworldwidestandardsand regulation inviewofafirmenergystrategy.ForSweden , the Netherlands and California,thisistheprimarydriver.Italyisa nexception,howeverthechoiceforpresenti ng brilliant metering there wasmadebyamonopolistbeforeprogressio n ofthe market.Soit seemsto be eventual fate of shrewd meteringwillrelyvigorouslyupontheenerg ystrategyanddefinitivenessoftheadministr ativebodiesincluded.Energyinvestmentfu ndsandanexpandedsecurity of supplywill befundamentaldrivers and put stock in smart meteringas a way to come to these objectives isvital.

Smart Healthcare Monitoring using IoT

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ABSTRACT

IoT in medical care is the vital participant in giving better clinical offices to the patients and works with the specialists and emergency clinics also. The proposed framework here comprises of different clinical gadgets, for example, sensors and electronic or portable based applications which impart through network associated gadgets and assists with checking and record patients' wellbeing information and clinical data. The proposed result of the paper is to construct a framework to give top notch clinical help to the patients even in the remotest regions without any medical clinics in their areas by associating over the web and getting a handle on data through about their wellbeing status by means of the wearable gadgets gave in the unit utilizing a raspberry pi microcontroller which would have the option to record the patient's pulse, circulatory strain. The framework should, in all seriousness close the patient's relatives and their PCP about the patient's ongoing wellbeing status and full clinical data on the off chance that any health-related crisis emerges. The gathered data can be utilized to break down and foresee constant messes or different sicknesses, for example, cardiovascular failures in fundamental stage itself utilizing the information mining methods that will likewise give the methodology beneficial to navigation.

I.INTRODUCTION

The "Internet of Items" links the sensors, software, hardware, and network connectivity of various items to improve their ability to gather and share data. What distinguishes the Internet of Things in the healthcare system is its ability to continuously monitor a patient by analysing a variety of data and extrapolating a successful outcome from

the history of such continuous monitoring. ICUs currently have a significant number of these devices with medical sensors. Even with round-the-clock surveillance, there may still be instances where an emergency cannot be discovered in time to alert the doctor. Problems may arise when data and information are shared with concerned family members, relatives, and competent specialists. But technology has already made these improvements possible.

A Raspberry Pi-based system for remote health monitoring is demonstrated in this study. A single-board microcontroller called the Raspberry Pi is intended to enhance computer science foundational education in colleges and developing nations. This essay suggests a system to continuous monitoring of vital markers like heart rate blood pressure and body temperature. The specifics are viewable after being entered into a database on a cloud server. An online website or mobile application can be accessed by authorised individuals.

The purpose of the paper can be summed up as follows:

- to use IoT current patient medical information.
- sorting and processing the information gathered about the patient.
- utilising data mining technologies to comprehend and foresee any illness or problem at an early stage, which will also provide a strategy useful for decision-making.
- to provide Internet of Things-powered healthcare solutions anytime, anywhere.

II.RELATED WORK

A lot of scholars have proposed numerous models for the IoT in Healthcare and the prediction of various types of diseases using diverse approaches. The focus of this section is on the work that has been done in the same area.

Ahn et al. [1] method for detecting physiological signals while seated, such as ECG and BCG, utilising a smart chair that senses the non-constrained bio-signals and can be monitored using a monitoring system they had devised, is a famous example of the usage of IoT in healthcare.

Almotiri et al. [2] utilizes cell phones to accumulate continuous information from patients in and Keep it on network servers connected to the web to empower access confined to a select gathering of clients. This data is usable. for the clinical conclusion of patients and is accomplished by utilizing various wearable gadgets and body sensor organization.

Barger et al. [3] made a brilliant house office utilizing a sensor organization to screen and track the developments of the patient in hoke and a model of the equivalent is likewise being tried. The essential goal of their work is to check if their framework is skilled to outmanoeuvre the personal conduct standards and have examined about a similar in their work.

Chiuchisan et al. [4] to guard against patient threats in intelligent ICUs. The suggested method alerts the patient's loved ones, the patient's doctors, and anybody else who needs

to know about any discrepancies in the patient's health, their bodily movements, or the environment of the room so that the appropriate safety precautions can be taken. In order to secure the clinical data that must be transmitted over the internet for Electronic Patient Record (EPR) systems

Dwivedi et al. [5] developed a framework. They recommend a multi-layered healthcare information system framework that combines Public Key Infrastructure, Smartcard, and Biometrics technologies.

Gupta et al. [6] developed uses a Raspberry Pi to measure and record the patient's ECG and other key health indicators will be very helpful to hospitals, patients, and their loved ones.

Gupta et al[7] .'s method uses an Intel Galeleo development board to gather various data, upload it to a database where it may be used by doctors, and lessen the discomfort patients feel from having to frequently visit a hospital to check their health parameters.

Lopes et al. [8] proposed an IoT-based platform for disabled people to investigate and find IoT innovations in the healthcare sector that can benefit them and their community. They selected two use cases to investigate the most recent IoT technology and its applications, which can be used largely for the disabled.

Nagavelli and Rao [9] proposed an unique mining-based statistical approach to estimate the degree of disease probability threshold from the patient's medical data. And in order to achieve their objective, they changed an

algorithm that is mostly needed to calculate the weight of the hyperlinks on websites.

Xu et al. [12] established a data model To collect and utilise the IoT data. To gather and publish IoT data globally so that it may be accessible from anywhere at any time, they built and created a resource-based Ubiquitous Data accessing mechanism. Additionally, they demonstrate an IoT-based emergency medical service as well as how to gather and utilise IoT data across several platforms.

III. SYSTEM ARCHITECTURE
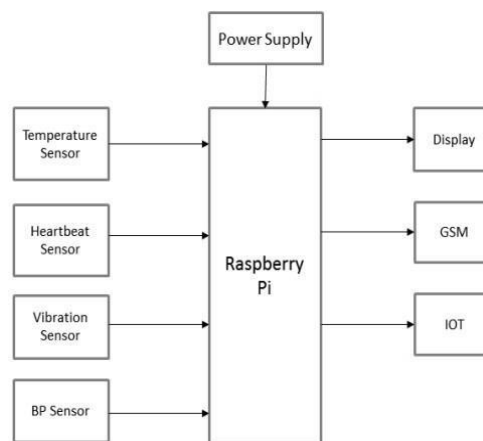
Figure 1. System Architecture

IV. PROPOSED METHODOLOGY

In this paper, we propose an automatic system to monitor a patient's movements, heart rate, body temperature, and blood pressure. We further extend the existing method to ascertain whether the patient has any chronic disorders or diseases using more health data and other symptoms gathered by the system.
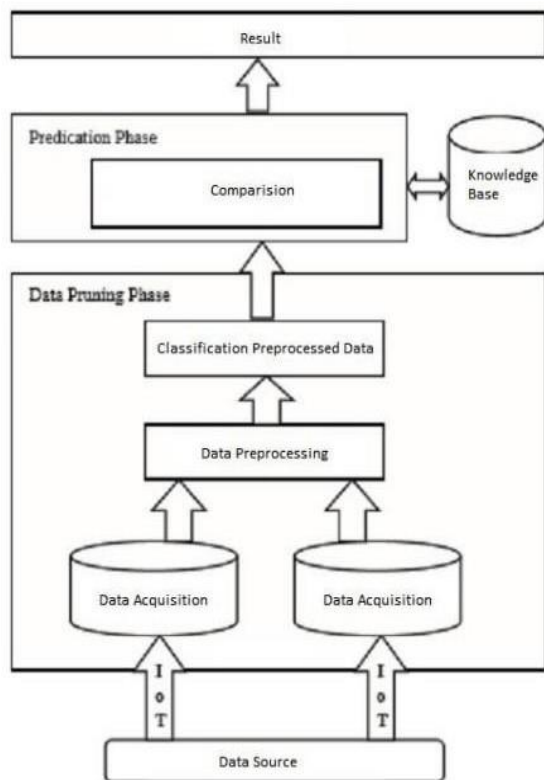
Figure 2. Proposed Methodology

The image above shows how to track a variety of metrics to gather details about a patient's health and use those details to ascertain whether or not the patient has a chronic illness.

Level 1, Unprocessed data is gathered and stored at level 1 on the server from a variety of IoT devices. These devices include a variety of sensors, such as blood pressure, pulse, vibration, and temperature sensors. Since some sensors give analogue output that the Raspberry Pi cannot use, we first convert the analogue values into digital form using converter ICs. The Raspberry Pi, which is running the Linux operating system, is then used to write the Python code that gets the values from the sensors.

Level 2 uses filtering, classification, and categorization to extract the relevant info from the stored data. Only the patient's current health facts and symptoms are included in this data. The patient's health status will also be determined at the subsequent step using this information. The system becomes smarter and more efficient as a result.

At level 3, which is the analysis and prediction phase, we use data mining techniques to forecast the kind and character of the illnesses or disorders for which the system was designed. Artificial intelligence can further enhance the system by making it more intelligent. As a result, we may identify the disease or affliction from the body of information that is already accessible and categorise the result.

V. SYSTEM MODULES

1)Health Monitoring Section

2)Emergency Alert Section

3)Health Status Prediction System

A. Health Monitoring Section

The physical components of the system that enable Internet of Things are included in this module, which is used to record the patient's health parameters using a range of sensors. The Raspberry Pi acts as the main server in this setup, and all the sensors are connected to it either via the GPIO pins or,

if their output is analogue and the Raspberry Pi only supports digital signals, the MCP3008 analog -to-digital converter. The real-time values that the pi reads from and updates in the mySQL database are shown on the web interface.

B. Emergency Alert Section

The steps that must be performed, such as notifying the patient's family and the hospital, when a patient's health begins to exhibit irregularities are the main focus of this module. When certain criteria are met in our software, an email or SMS alert is sent to the patient's family or doctor. The many values used here are

Table 1: Threshold Values

Component	Normal Range
Blood Pressure	80-120 mm Hg
Body Temperature Heart Rate	36.5-37.5C
	60-100 beats/m

C. Health Status Prediction System

This is perhaps of the most intriguing module with regards to our framework. In this module, we foster a productive Master Framework with suitable information mining strategies to foresee whether the patient might have any sicknesses or problems by involving the patient's wellbeing data as recorded by our framework, alongside any side effects they might be encountering, and contrasting it and the current information base.

VI.IMPLEMENTATION

This is quite possibly of the most fascinating module with regards to our framework. In this module, we foster an

effective Master Framework with fitting information mining strategies to foresee whether the patient might have any illnesses or problems by contrasting it and the current information base involving the patient's wellbeing data as recorded by our framework alongside any side effects they might insight.
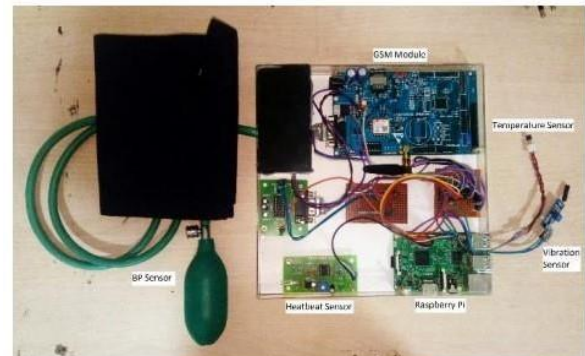
Figure 3. Experimental Setup

Python is the programming language used on the Raspberry Pi, and it communicates patient health data to a server linked to the Internet. It is straightforward to obtain the data online and monitor the patient's health by utilising proper credentials.

The various Components to be used in system are :

A. Raspberry Pi

The Raspberry Pi is a credit card-sized microcontroller with the capabilities of a miniature computer since it has the entire Linux server and peripheral device connection on a single chip and is relatively inexpensive. The board's GPIO pins are utilised for input and output purposes and can be programmed as needed. We'll be using a Raspberry Pi board version 3 for the suggested setup. Together, the

Raspberry Pi and IoT show themselves to be a cutting-edge breakthrough in healthcare technology.

Figure 4. Raspberry Pi

B. Temperature Sensor

For assessing the temperature LM35 sensor has been used which is an IC sensor used to evaluate the temperature with the help of the straightforward outcome comparing to the temperature.

Figure 5. Temperature Sensor

The LM35 is an IC temperature sensor with an outcome voltage which is comparing to the Celsius temperature. The LM35 is better than straight temperature sensors which have change in Kelvin, since one doesn't need to take out a enormous reliable voltage from the outcome worth to get the Celsius scrutinizing. These amazing components of the LM35 sensor make interfacing with a circuit extremely straightforward.

C. Heartbeat Sensor

The beat is assessed using several Determined and LDR likewise, a microcontroller and it manages the fundamentals of optoelectronics. The infrared radiation is delivered by IR drove likewise, the infrared light is reflected by the surface. The power of radiation made electron-opening pair which subsequently produces spillage current. This progressing appropriately delivered is sent

through a resistor to get the relating voltage. Consequently, the more significant is the force of the episode pillar, the greater worth of voltage spilling across resistor will be obtained.

Figure 6. Heartbeat Sensor

The beat is assessed by putting the tip of pointer upon the sensor. At the point when the circuit distinguishes the beat, a Drove will start glimmering close by your pulse. The outcome is sent to a circuit or a small controller to measure the heart beat rate in BPM.

D. Vibration Sensor

The vibration sensor used in here identifies the shaking of the incorporating and

consequently we use it here to screen whether the patient is shivering so fitting aide can be given.

Figure 7. Vibration Sensor

Ideally, the two contacts of sensor don't get in touch with each other. Exactly when by any external power these two contacts contact each other and when the power is wiped out the sensor terminals separate. The on-board blue Drove apparently illustrates correspondence on the web and sanctioning.

E. BP Sensor

For assessing the circulatory strain, we have used here a manual circulatory strain screen as opposed to a modernized one in every way that really matters more affordable. It is commonly known as a sphygmomanometer and the unit contains an arm sleeve, a press bulb to explode the sleeve, stethoscope and a sensor to examine the pressure. Blood pressure is measure using a pneumatic power sensor. The readings are as electrical signs. These readings are besides exchanged over totally to automated design to be examined by the Raspberry Pi.

Figure 8. BP Sensor

F. ADC

The MCP3008 is a negligible cost 8-channel 10-bit easy to mechanized converter. This chip is a staggering decision in the event that one necessity to examine clear straightforward signs, as from a temperature or light sensor.

Figure 9. MCP3008

G. GSM Module

The GSM module required here in this paper is GPRS/GSM Quadband Module (SIM900) which offers GPRS affiliation to our structure, and consolidates the SIM900 correspondence module from SIMCom. This module can recognize any sort of sim card having its own exceptional number. The identical can be used to send messages, make

choices or make connections to give web accessibility. The data from the above sensors is consistently revived in MySQL informational collection which is associated with the web UI using the python code. The patient can sign in and screen their prosperity status at whatever point. The system is made splendid to set off a SMS/Email alert through the suitable entryways which ensure a compelling transport of the message. Furthermore, the characteristics from these sensor in blend in with various after effects which are asked from client considering starting finding is used to expect the ailment patient is encountering, if any, using the data mining technique through our programming reasoning and is shown due to examination close by the nuances of an expert for the sickness in their space.

VII. RESULT

As the title says, the outcome of Clever Prosperity Noticing structure is of ridiculous use to patients and experts too. The patient can check their prosperity status at whatever point from the comfort of their homes and visit facilities similarly as necessary. This ought to be conceivable by using our system whose result are brought on the web and ought to be apparent from wherever all around the planet.

Since it is a model, our system shows the almost consistent potential gains of various prosperity limits and emulates how the identical can be executed truly. The experts can moreover use the log of the patient body condition to study and choose the effect of prescription or other such things

Figure 10. Screenshot: WebUI

The keen assumption module predicts the contamination that the patient is encountering by asking them for various secondary effects they could have and the options rely upon the past secondary effect. The last end is made after somewhere near 3-4 secondary effects are perceived. The result is by and large exact if more besides, more secondary effects are recognized. A model screen shot of the web association point ought to be apparent in Fig. 10.

VIII. CONCLUSION AND FUTURE WORK

In this paper, we have presented and shown the model for a customized structure that guarantees a predictable seeing of different prosperity limits and assumption for any kind of sickness or disarray that keeps the patient from the disturbance of paying ordinary visits to the centres. The proposed structure can be set-up in the clinical centres and gigantic proportion of data can be moved and taken care of in the electronic informational index. Without a doubt, even the results can be made to be gotten to from adaptable through an application.

The structure can be also chipped away at further by adding man-made cognizance structure parts to work with the subject matter experts and the patients. The data, including clinical history of many patients' limits and looking at results, can be explored using data mining, searching for dependable models additionally, deliberate associations in the affliction. For instance, if a patient's prosperity limits are changing in something almost identical plan as those of a past open minded in the informational index, the results can in like manner be evaluated. On the off chance that the similar models are viewed as on and on, it would be easier for the subject matter experts and clinical experts to find an answer for the issue.

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SMART VEHICLE PARKING SYSTEM

Abstract

Smart Vehicle Parking System is a solution for the parking of vehicles and for missing vehicles. It is an app based development system. By this system, one can find the theft and missed vehicles. It works by sending a confirmation message to the user and a record of parked vehicles will be maintained by the parking lot management. In case of missing vehicles, the record helps in finding the location of the vehicle. The users and the parking lot owners are equally beneficial and the crime rate of theft vehicles will be highly reduced. In this system, the parking lot must register and enter the information of vehicles into a form which is centralized and stored in a common databases.

Introduction

Smart Parking is one of the most popular Smart City initiatives at this moment. Because of the flexible, scalable and easy-to-install nature, Smart Parking is a low barrier solution for cities that want to harness the power of IoT to bring large benefits to its citizens. One of the most critical problems in urban cities is car parking and traffic control systems. Finding parking space is often difficult for drivers in modern cities, thanks to the growing number of private car users. City planners can see this situation as an opportunity for IoT-based smart parking in a busy city environment to ramp up the efficiency of their parking facilities and lead to reduced search times, congestion. Following the rapid development of sensory technology, many modern cities have chosen to deploy various IoT-based systems for monitoring purposes. For example, some parking programs claim that citizens get real-time information about available parking spaces with IoT smart parking systems. Such systems require efficient sensors installed in parking lots to accommodate residential and data processing units to quickly obtain real-time data from various sources. According to Wards Intelligence, the global vehicle population stood at 1.32 billion cars and trucks by the end of 2016. This number is more than double the amount compared to 20 years ago. On top of it all, vehicle production and sales aren't showing any signs of slowing down. By 2035 it is expected that there will be almost 2 billion cars on the road, and some think it could be even sooner. With this staggering growth of vehicles but a limited amount of parking availability, the parking environment needs to adapt.

Components Implemented

NFC Tag Reader

NFC, Near-Field Communication, is a set of communication protocols for communication between two electronic devices over a distance of 4 cm (1.5 inches) or less. Simple tags offer just read and write semantics, sometimes with one-time-programmable areas to make the card read-only. More complex tags offer math operations, and have cryptography based hardware to authenticate access to a sector. The most sophisticated tags contain operating environments, allowing complex interactions with code executing on the tag NFC tag reader is an NFC device that works in NFC reader or writer mode, which enables this NFC device to read information stored on inexpensive NFC tags embedded in labels or smart posters. NFC tags are passive data stores that can be read and under some circumstances written to, by an NFC device. Typically, they contain data and are read-only in normal use, but may be rewritable. NFC devices can also unlock doors and store user profiles for settings such as seat positions and radio stations. By using your NFC smart phone or a NFC tag you can lock or unlock your vehicle. As well as access, there are many other automotive applications for NFC. To start, it provides a simple and secure way of linking your phone to a car's infotainment system. NFC modules in cars are in three primary locations: the door handle, the B-pillar between the front and backside windows, and the center console inside the vehicle. The first two control the access to the vehicle by unlocking the doors and allowing for very different designs.

Sensor

A sensor is a device, module, machine, or subsystem that detects events or changes in its environment and sends the information to other electronics, frequently a computer processor. Sensors are always used with other electronics. A sensor is a device that produces an output signal for the purpose of sensing a physical phenomenon. Sensors are used in everyday objects such as touch-sensitive elevator buttons and lamps which dim or brighten by touching the base, and in innumerable applications of which most people are never aware. With advances in and easy-to-use platforms, the uses of sensors have expanded beyond the traditional fields of temperature, pressure and flow measurement. A sensor's sensitivity indicates how much its output changes when the input quantity it measures changes. Sensors play a major role in creating acknowledgement using IoT. Generally, sensors are used in the architecture of IOT devices. There are enormous types of Sensors available Which is used in collecting the Information i.e. data and storing it in the server. In an IoT ecosystem, there are two main things we have to consider like the internet & the physical devices such as actuators & sensors. The sensor and network connectivity in the IoT mainly located in the bottom layer. The main

function of this is to collect the information. This bottom layer in the IoT is a very importantpart, and it includes connectivity of network to next layer like the gateway & network layer.

Camera

A camera is an optical instrument that can capture an image. Most cameras can capture 2D images, with some able to capture 3D images. At a basic level, most cameras consist of sealed boxes, with a small hole that allows light through to capture an image on a light-sensitive surface. Cameras have various mechanisms to control how the light falls onto the light-sensitive surface. Lenses focus the light entering the camera. The aperture can be narrowed or widened. A shutter mechanism determines the amount of time the photosensitive surface is exposed to light. Camera is not only used for Photography, cinematography, visualization but also in Theft Identification, Monitoring, Stocking the image data etc. One popular application dominating the IoT and security solution sector is smart CCTV systems. It's common to find a connected IoT camera in nearly every smart application, from doorbells and elevators to building management systems. Operating within a network of motion sensors, smoke detectors, and alarms, smart CCTV cameras can alert an operator to an incident and even act autonomously to request help from emergency responding. IoT camera enable operators to: Monitor who is entering and leaving the particular area. Track stock, as it moves through the facility. Consistently monitor your facility conditions and quickly

detect changes in the environment to avoid spoiling stock. Act quickly on security alerts without the need to review footage.

Solar Panel

A solar cell panel, solar electric panel, photo-voltaic (PV) module or solar panel is an assembly of photovoltaic cells mounted in a framework for generating energy. Solar panels use sunlight as a source of energy to generate direct current electricity. A collection of PV modules is called a PV panel, and a system of PV panels is called an array. Arrays of a photovoltaic system supply solar electricity to electrical equipment. A single solar module can produce only a limited amount of power; most installations contain multiple modules adding voltages or current to the wiring and PV system. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for energy storage, charge controller, interconnection wiring, circuit breakers, fuses, disconnect switches, voltage meters, and optionally a solar tracking mechanism. Equipment is carefully selected to optimize output, and energy storage, reduce power loss during power transmission, and convert from direct current to alternating current. Solar can make sense for an IoT application when the battery life of the system is between 4 and 365 days and there is no grid-based power source available. Solar used in IoT applications needs to withstand long term exposure to UV, temperature extremes, water/humidity, vibration and impact. Solar energy has taken the lead in renewable

energy use for a plethora of reasons, including high consumer demand for renewable energy sources, reduction in production costs, tax rebates for solar energy system installations, the ability for consumers and communities to send and sell solar energy into the grid via net- metering, and storage in solar batteries, such as those made by Tesla. The great catalyst for solar adoption, however, is the Internet of Things, or IoT. The IoT makes solar energy generation and service more visible, measurable and cost-effective.

NFC Tag Reader

Motion Sensor

Smart Vehicle Parking System

CCTV Camera

Solar Panel
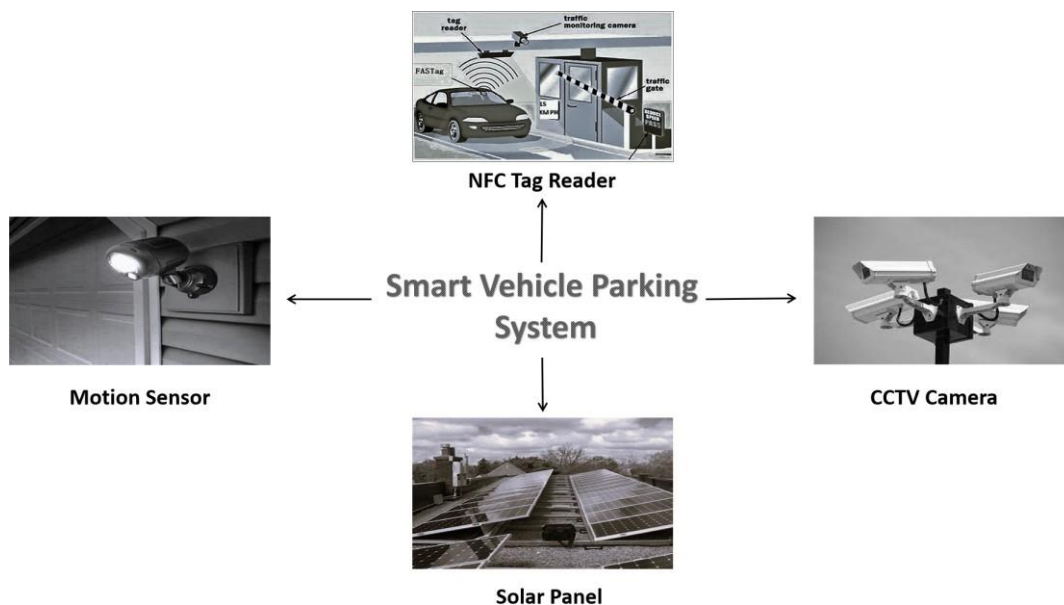
Operation

Consider a car coming into the parking lot, The entry will have NFC tag reader which is used for reading the entry of the car and via NFC payment can be made. This reduces the workload of both customer and worker and also it is error -free. The cameras can be fit in four directions of the parking lot ensuring the safety of the customer's vehicle which adds to the customer service. The sensors are fitted on the ground indicating the movement of vehicles (position of 4 wheels) in and out of the parking lot. It also indicates the direction of the path, the car is travelling. The solar panels can be fitted on the top of the roof which makes the parking lot more reliable and pollution free. Also it is drafted to be surrounded by green environment and cool atmosphere. The electricity produced by the solar panels is used for the devices in the smart parking system. Motion Sensor is used here to turn on/off the indication light automatically by sensing the movement of the vehicle. Thus, a green and smart parking system is fully furnished.

User Data entry:

The customer and the vehicle information are directly entered by using NFC tag reader which paves the way of error-free entry. It grabs the customer's name, bank account, vehicle number and phone number. The bank account number

specified above is used for making Payments. A message is sent to the user for the confirmation of the vehicle parked there. The data which is collected using tag reader is directly entered into a centralized database which helps in finding the missed out and theft vehicles.

Benefits

✓ Reduces the parking stress

✓ Time efficient solution

✓ It provides real-time data sets, used in identification

✓ Creates the possibility of new business models

✓ Ensures the safety of the users

✓ Establishes integrated payments via online

✓ Sensors accelerate the process and make them more accurate

✓ Lower energy wastage

✓ Motion sensor helps to light up difficult areas

✓ NFC reader makes the transactions easy

✓ Remote monitoring using camera

✓ Solar panels increases access to energy

✓ Also, solar energy has the support from government

✓ Green source of energy

✓ Low maintenance cost

Conclusion

Parking vehicles and paying fee for the manual worker is an out-dated trend. Using Smart Vehicle Parking System is the urban trend. So people now have to keep up with trend. In addition it is more secure, reliable, time efficient, green, simple than the regular parking system. Iot is a blooming field, so implementation of IoT in projects similar to this will remita huge success. Vehicles which are used in present days, for about 50-70% come up with the NFC tag. Therefore, it adds an additional advantage to this smart parking system. Technologyimplemented in this smart parking system is time efficient. So users no need to spend prolonged time to park their vehicles. Camera used in this system helps in surveillance and

also cost efficient. So it promotes economic well-being for the users. Solar panels used in thissystem in environment friendly and promotes energy independence. Thus, Smart Vehicle Parking System clinches the betterment of the users.

SMART WASTE MANAGEMENT SYSTEM
FOR METROPOLITAN CITIES

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Abstract - Waste bins have been part of ourlives for decades and mostly its condition isoverflowingduetoimproperwastedumping, collection and management, whichleadstofoulsmellandunhygienicconditions,thusinherentlyresultinginenvironmental pollution. Therefore, in thispaper, design of a Waste Bin with real timemonitoring is presentedand a smart wastemanagementsystem isproposedusingtherecenttechnicaladvancementsofautomation andInternet of Things (IoT).Thecapacitancesensorinthebincontinuously monitors the level of the bin inreal timeand communicates to the centralcloudwherethebinsareconnected.Ultrasonic sensor is used to open and closethe lid of the bin whenever the persons arenearbythebin.Suchsmartbinsareconnected to the cloud, where thebin statusare communicated, recorded and monitoredby the local bodies through an android appor acentralized server. Thus the designedsmart bin and proposed waste managementsystemhaveabetterlevelofsmart nesscomparedtoexistingonesinmetropolitan citiesinacentralizedmanner.

I. INTRODUCTION

The smart way of doing things is theconcept behindthe smart city"s development withless manpower andmaximum utilization of technology in the day today life.The use oftechnologies is very significant towards thedevelopment of smart cities. Automation is the keypartin the smart cities irrespective of various needsandapplications [1]. At places, whether it is a ruralor urbanarea or apartment or multi storey buildings,there occurstheaccumulationofwastes.Theapplicabilityofaproper waste management systemis significant at thispoint. Rise in urbanization andincrease in populationmatches up to the quantity ofsolid waste in today"s life[2,3].Therefore,solidwastemanagementandmanaging the condition ofthe waste bins possess amajor challengeinmetropolitancitieslikeChennai,India. Waste binsare part of our lives for decades andmostly thecondition of the waste bins is overflowingduetoimproperwastedumping,collectionand managementleadstofoulsmellandunhygienicconditionsw hichinherentlyresultsinenvironmentalpollution.

The old-fashioned method of management ofsolidwasteisanunwieldyandintricateprocess,whichutili zes enormous human effort, valuable timeand heftycostandisnotwellmatchedwithadvancementintechno logies. One of the smart waysof monitoring thethings is the use of "Internet ofThings" (IoT). ThroughIoT,deviceswithinternetconnectivitycanbemonit oredandcontrolledremotely.Wehaveproposed

a waste managementsystem by utilizing the concept of IoTto connect thedifferent dustbins at different locations andalso toidentify the level of waste in a dust bin through acentralized system. Hence, the concerned personswill benotified about each bin status and therebyachieving theremovalofwastesin aproperway.

Asmartbinforwastemanagementisdesignedusingan Arduino microcontroller, Wi-fi module andsensors toindicatethelevelofwaste,todetectharmfulgasandclosing of the lid thereby giving asolution to collect thewaste in the proper way [4]. Realtime monitoring andcollectionofsolidwasteforsmartcityservicesisaddressed in [5], where eachbin is installed with Arduinomicrocontroller,ultrasonic sensor andRadioFrequency(RF)transmitter on the top of the container which sendssignal to the control center through GSM/GPRSwhen thebin isfilled[5].

Smart Garbage Management System is developedandaddressed in [6] where, IR sensors embedded ondustbinsfor waste level detection, GSM 900 modemis used to sendwasteleveldatacollectedbymicrocontroller,withanadditionalgraphicaluser interfaceusingMATLABsoftware.Asmartwastemanagement system is proposed by an on-site andreal timemonitoring of waste as well as a dataelaboration throughdecisionalalgorithms[7].Anautomaticsmartwastema nagementsystemispresentedin[8],wheresmartvehicle system with a local base station and a trash systemwith smartmonitoring & controlling hut having two loadsensorand IRproximitysensorwereusedandaddressed.

In [9] a step had been taken to connect the various sensoror actuators in a network through an AccessPoint (AP) tothecloudandinvestigatedonthreedifferentsensorapplicatio ns. Power consumption,Interference impact andrange performance analysisare alsoevaluatedfor eachapplicationanddiscussed.Smartcommunityisanemergin gapplicationoftechnologicaladvancementofIoT.

IoT and Wi-Fi is also introduced based on reduce,reuseand recycle concept. It is like an enforcementsystemthat makes the people to classify the wastefor recyclingand also used DeviceBit and Blynkapplications for realtimemonitoring[17].Astepistakentowardsthedetailed analysis of various waste management modelsand an IoT based referencemodel is implemented andcompared with theexisting models to identify the bestchoiceandresearchchallenges [18].

Accordingtotheliteraturefoundanddiscussednumero useffortsweremadeinsolidwastemanagement and in IoT. However, the majorchallengeis to bring together the best method ofSolid wastemanagement and the technicaladvancements of IoT.Therefore, In general, a smartwaste monitoring systemconsists of sensors,transmission medium, waste leveldata acquisitionand collection system and connectivityto the

cloudhas to be found inside a waste bin forhavingsmartnessinthesystem.Inspiredfromthe

Smart community architecture is defined and realizedby connectingindividual homes through IoT. A similarapplicationof the smart community in NeighborhoodWatchandPervasiveHealthcareispresentedandchall engesinvolvedarealsodiscussedin[10].Apossibility ofusing Mobile-2-Mobile (M2M) solutionsformanagementofroadtrafficlinkingIoTisinvestigatedin[11].TheuseofIndustrialWirelessSensorNetworks(WSN)inIoTenvi ronmentisalsoproposed in [12]. In this work, the design of a smartsensorinterfacebyconnectingthesensorsinWSNallowingther econfigurabilitybyreadingthedatainparallel as well as in real time using ARM Controllerisalso discussed in detail. Similarly, a smart homecontrolnetworkisdevelopedandevaluatedforthesmartcontrol of lighting systems in smart homes byusing ascalable architecture combining WSN andPower linecommunications (PLC) technologies. This also resultsin less radio interference and allows an easy replacementofnodes inaWSN [13].

AnIoT-basedSmartGarbagesystem(SGS)isreportedin[14]whichareo peratedinGangnamdistrict, Seoul for a period of one year resulting inthereduction of food waste by 33%. Battery basedsmartdust bins are connected in wireless meshnetwork and arouter and server is used to transferthe informationcollected in this work. IoT architecture for optimizedwaste management insmart cities is also realized in[15], where LoRaLPWAN (Low Power Wide AreaNetwork) technology is used for the transmission ofdatacollectedfromthemicrocontrollerconnectedultrasound sensornodes.

A Spatial Smart Waste Management System(SWMS)isimplementedinMalaysia inorder tomanage thewastes by giving alerts about the wastelevel in a bin tothe contractor for optimizing thecollection routes andpenalizes if not collected thegarbage on time [16]. Asmart recycle bin based on

literatureandtheSwachhBharatinitiativeoftheGovernment of India, the main objective of this paperis to designand develop an IOT Enabled Smart WasteBinwithRealTimeMonitoringforefficientwastemanag ement system. The developed system intend toreduce valued human resources effort, time and costaswell as to protect the environment and healthy living ofthe people with the help of Modern technologies suchascloudsystem,Wi-Fi,ultrasonicrangersensor,capacitiveaction.

II. METHODOLOGY

Inspiredfromtheliteratureandasapreliminarystudy, design of a smart waste bin is presented in thissection. This section also describes the use ofdifferentsensors, actuators and controllers associatedwith thedesign of the smart bin. The waste leveldetection usingthecapacitancemethodisalsopresented.Further,a

smart waste managementsystem utilizing the designedsmart bins is alsoaddressed as a proposed system usingthe recenttechnical advancements of automation andtheInternetofThings (IoT).

A. DesignofSmartDustBin

Figure 1 shows the block diagram of a smart wastebin,wherethesmartnessisachievedbyhavingultrasonic sensors, capacitive sensors,microcontrollers,servomotors,NodeMcUandintegratingtoformacomplete autonomous system.The waste level insidethebinisdeterminedbyestimatingthedistancebetweenthebottomofthebinandthelidusingultrasonic sensor. In addition to this,the level of wasteisalsoestimatedbyusing
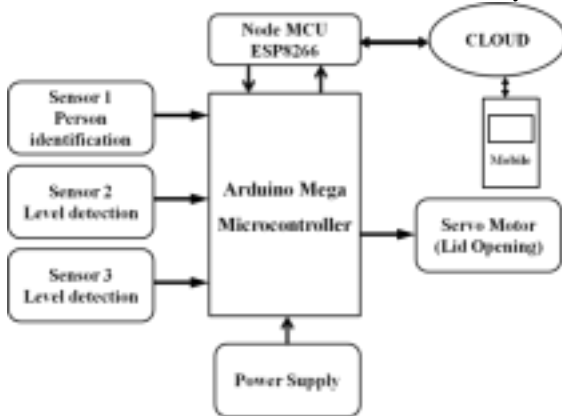
Fig.1. BlockdiagramofSmart DustBin.

Changeincapacitanceprinciplebyhavingparallelplates inside the bin. The sensors are connected withthecontrollerandthelevelsarecontinuously recordedin

An Atmega2560+NodeMCU ESP8266microcontrollerwith32Mb(megabits)offlashmemory, working on arduino developmentenvironmentis used as a controller to integrate thesensors, actuatorsand communication devices toprovide the necessaryactions required by the smartbin. The advantage ofusing this controller is that theall of the modules canworktogetheroreachseparately,eliminatingtheinterface issues, whencompared to the other arduinocontroller used in theliteratures. NodeMcU is used asthe communicationdevice which connects the systemwith the IoT cloudby broadcasting the level of waste inbin, status ofthe bin along with the bin ID and location.Further,italsobroadcaststhealertsignaltothesanitationinspectororcentralmunicipalserverwheneverthebinexceedsthe90%thresholdlevellimits. UniversalDatagram Protocol (UDP) is used asthecommunication standard by the system, with themaximum packet size of 255 bytes. However, only40bytes are used as a packet size out of which 8bytes areused as UDP header and remaining

32bytes for data toeffectivelycommunicatethestatus informationtothe

the cloud. When the waste level exceedsthe thresholdvalue, which is set according to the dimension of thebin,thecontrolleralertstheresponsiblemunicipalpersons or the sanitaryinspector with the bins ID, binlocation and the binlevel. An automated opening andclosing of the binlid is also incorporated by havinganother ultrasonicsensor, which opens the lid of the binwhenever itperceives a person nearby to the bin. Apower supplyunit provides a necessary power to theoperationofthebin.Oncethebinisemptiedandserviced,it returnstothedefault operation.

A commonly used cylindrical plastic trash binwiththedimensionof30x20x60cmwithlidisusedtodevelop the smart bin. As shown in figure 1, thesmartbinusestwoSRF 04ultrasonictransceiversforthedetection of waste level and to perceive themotion of aperson nearby bin respectively. Theultrasonic sensorsare operated with the frequency of40 KHz and the timeof flight method is utilized toestimate the level of wasteinside the bin and also toestimate the motion of theperson when he fallsinside the threshold value of 30cm.Ultrasonic sensor1 is mounted facing the bottom of thebin, whichmeasures the level of waste inside the binwith the threshold of 25%, 50%, 75% and 90% of thebindepth of 60cm. Similarly, ultrasonic sensor 2 used todetect the motion of the person is mounted at the topofthe bin facing outside. TowerPro MG995 MetalGearServo Motor with 180° operation is used as theactuatorfor opening and closing the lid of the binwhenever thesensor perceives the nearby motion ofthe person. Thelid closes automatically when theperson moves awayfrom the thresholddistance. ArechargeableLithiumPolymer (LiPo) battery of2200mAh, 11.1V is used as apowersupply totheentiresystem.Entireelectronicsystem is mountedwithin a weather proof casing andfixed inthetrashbin.

cloud as shown in Figure 2. Thedata byte consists ofBinID,LocationwithLatitudeandLongitudeinformation ,Bin Level,StatusandPowerlevel.

Fig.2. UniversalDatagramProtocol(UDP)packet.

Asmentionedintheprevioussection,theentireprocessisdevelopedin ArduinoIDE.Figure3showsthe flowchart of the arduino program where themotiondetectionandlevelmeasurementisexecutedinparallel.
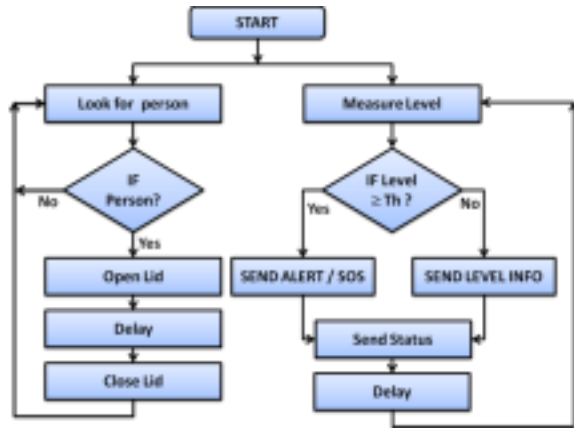
Fig.3. SoftwareflowchartofSmartWasteBin

In order to have efficient communication methodasper UDP protocol each bin is identified bydedicated IPaddress configured in the NodeMcUand updates theinformation of the bin to the cloudfor predeterminedminutesestablishingtheconnectionwiththec loudusing polling strategy.Polling strategy isutilizedtoroutethedataefficientlytothecloud,sincetheNo deMcU haslimited memory and energy constrained,therebyreducing communication overload. As the dataarelogged into the IoT cloud, the level and status of thebins along with the alerts are monitored using theblynkmobile app installed in the sanitation inspectorand thecentralized municipal server. Once the binsare servicedand the wastes are removed, the systemreturns back totheoriginalstate.

B. ParallelPlateCapacitorbaseddetectionofwa stelevel.

Most of the design for smart waste bin found intheliteratureusesultrasonicsensorstodetectthelevelof

$$C = \varepsilon_r \varepsilon_0 \frac{A}{d}$$

Where,
„C"isthecapacitancebetweentheparallelplates,„ε₀"is the permittivity of the free space which is8.854x10⁻¹²
„ε$_r$" is the relative permittivity or dielectric constantofthematerial between theplates,
„A"isthecrosssectionalareaoftheplates,„d"isthese parationdistancebetweentheplates.

As the wastes are dumped inthe bin the, the waste /trash acts as a dielectric medium between the platesandthe capacitance between the plates changes dueto thechanges in the relative permittivity (ε_r) of thematerial.Asaresult,thischangeincapacitancevalueiscor relatedtothelevelof waste insidethebin.

wasteinthebinwhichwereverysimilartothetechniquediscu ssedintheprevioussectionsandasmentioned in figure 4 (a). However, this leveldetectionis prone to errors while opening the lid ofthe waste bindue to the motion of the person nearthe bin to dump thetrash. The lid opening causes thesensor to move awayfrom the sensing field of view as depicted in figure 4(b),andprovidesfaultydatatothecloudandamunicipalsanit ary inspector.Inorder toavoidsucherrors, the level of wastedetection is achieved using asimple parallel platecapacitance principle as given infigure 4. Twocopper plates of dimension 50cm x 5cm x0.3cm isused as the electrodes and mounted opposite toeachother, in the wall of the bin as shown in figure 4.Theseplatesarewiththecrosssectionalareaof250cm²and separated with the distance of 18cm, withtheinitialcapacitancevalueof1.22pFbygeneralcapacit ance equation given as equation 1,consideringthe permittivity of free space and air asthe dielectricmediumbetweentheplatesassumingthearenow astesin thebin.
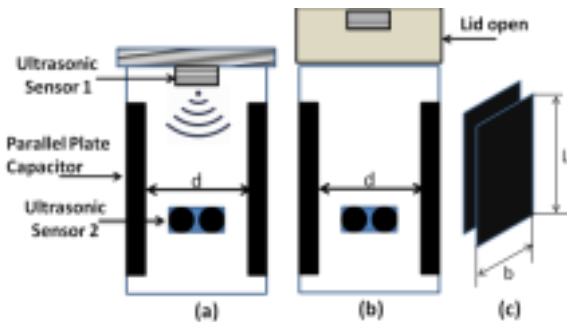

Fig.4.(a)Smartbinwithlidclosedandparallelplates (b)Binwithlidopenandpositionofsensor(c)Parallelplates as capacitors

IoT Enables Smart Waste Bin with Real Time Monitoring forEfficientWasteManagementinMetropolitanCities

Figure5showsasignalconditioningcircuitdeveloped to convert the change in capacitance valuetoelectricsignalwhichcouldbereadbythemicrocontro llerforfurtherprocessing.Thiscircuitconsistsoftwostagesw herethefirststageisthesensing and transduction stage in which thecapacitanceis converted into the electrical signal bymeasuring thevoltage drop across the capacitorwhich is given byequation2.

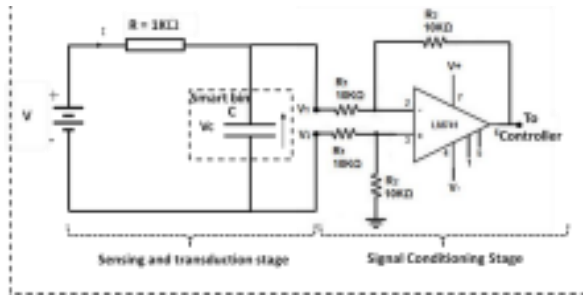**Fig.5.**Sensing,transduction andsignalconditioning circuitusedtoconvert

$$V_C = V\left(1 - e^{-t/_{RC}}\right) capacitanceintoelectricalsignal$$

(2)

Where,

„V"istheappliedvoltage

„Vc"isthevoltagedropacrossthecapacitor„R"istheresistancevalue

„C"isthecapacitanceoftheparallelplates,„t"istheelapsedtime.

As the change in capacitance due to change in thelevel of dielectric constant, is very small, the voltagedropacrossthecapacitanceisalsoverysmall,whichhas to be amplified so that the microcontroller canreadthe electrical values. Therefore, the second stageof thesignal conditioning circuit has a differentialamplifierdesigned using op-Amp LM741/OP07,with appropriategain values. Hence, the voltageacross the capacitor isamplifiedandfedtothemicrocontrollerforthedetectionoft rashlevelinthebin.Thismethodofdetection ofwastelevelis simpleand

cost effective when compare to the use of ultrasonicsensors

III. EXPERIMENTSAND RESULTS

Design and development of an IoT enabled smartwaste bin using parallel plate capacitance andultrasonicsensor based level detection is presentedand

discussedintheprevioussection.Seriesofexperimentswere carried out to measure theperformance of the waste bin.Experiments wereconducted by establishing a cloudlinking the wastebins with the local area network in

ourcentreatHindustanInstituteofTechnologyandScience. Experimentsareconductedusingplastic

communicate the status of the smart waste binsenablingtheeffectivewastemanagementsystem,

bottles andpaper as trash. The change in capacitance isestimated to be 4.6pF, when the bin is full of plasticbottles as trash and 2.2 pF for the full bin with paperastrash. Figure 6 shows the value of capacitanceobtainedtheoreticallyaswellasexperimentallyf ordifferentlevels of the bin. The statuses of the binsare monitoredusingtheblynkapp, runninginthemobilephone.

Figure7,depictsthequalitativeresultsofthestatuses of the bin monitored using blynk app. Thelevelof waste in the bin is represented by trafficlights in theapp where red indicates the fullness ofthe bin, greenindicates the 25% level and yellowindicates the 50%level. It could be observed fromfigure 5, that whenevera motion is detected near tothe bin, the bin lid opensautomaticallyandthelevelofthebinisdetected,comm unicated to the cloud anddisplayed in the appeffectively.

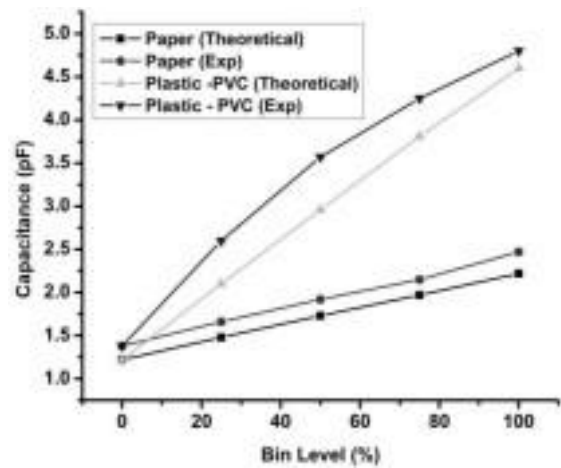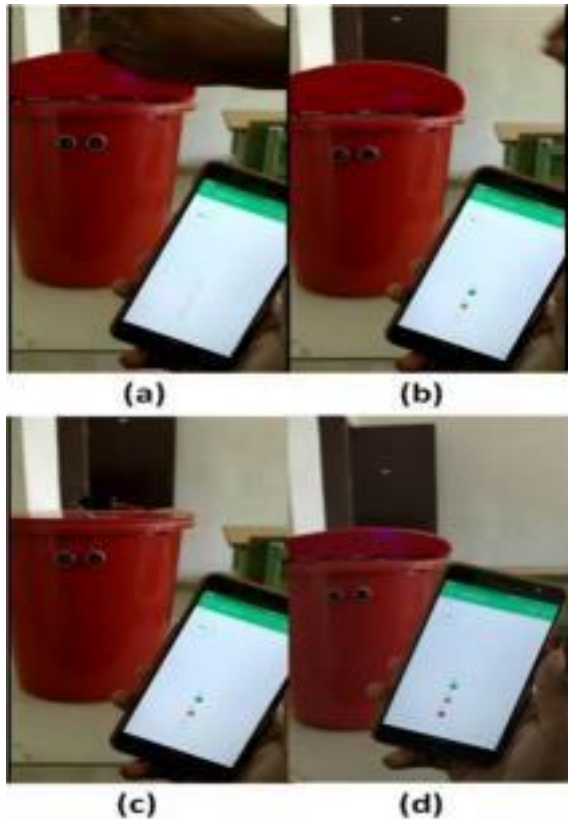**Fig.6.**Capacitancevaluesfordifferentbinlevelsforpape rand plastic-PVC as trash.

IV. PROPOSEDSYSTEM

Figure 8 shows the general architecture whichusesthe cluster of smart waste bins connectedthrough

IoTintheoutdoorenvironmentasmentionedintheprevious sections. It uses a GPS,GSM/GPRS modulesinstead of the NodeMcu"s to

Fig. 7.(a) Detection of motion and opening of lid withbinempty, (b) bin is 50% full and lid open, (c) bin is50% fulland lid is in closed condition when motion isnot detected   (d) Alert due to the bin is with full ofwaste.
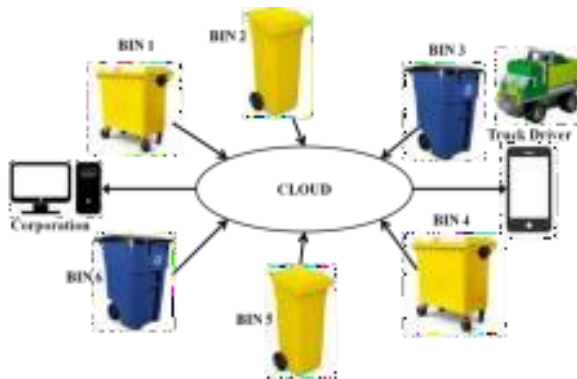
Fig. 8. Architecture of the waste management system usingsmartwastebins andIoT.

Which is planned to be implemented in ourHindustanInstitute of Technology and Sciencecampus. Figure 9depictsour proposedarchitecturesimilar totheoneillustrated in figure 6. The majordifference is that thesmartness of the waste bin isimproved by adding themobility for the bins tomove from its location throughfollowingguidelines tothecommonwastemanagementdumpyardratherthan indicatingto thesanitaryworkerto serviceit.
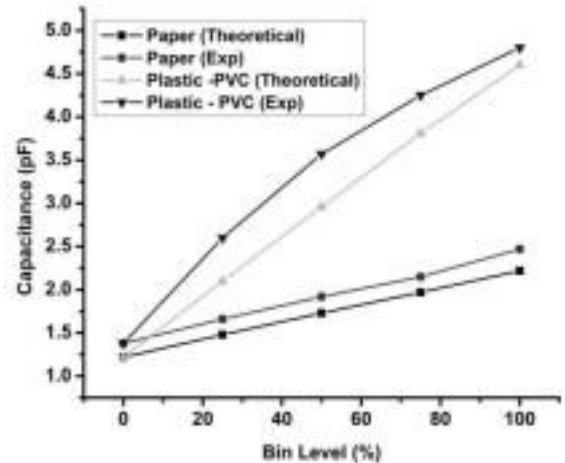
theindoorwastemanagementsystemusingroboticsmart wastebinsandIoT.

Therefore, the proposed system could beconsideredasaroboticsmartwastebin,wherethebinscould mobilize, localize its location;communicate its status tothe cloud. During the binsare serviced at the dump yard,spare bins couldautomatically replace the serviced binsenhancing theeffectiveness of the system. This conceptis proposeddue to the evolution of the smart buildingsandsmarthomesinrecenttimesanditcouldbeapote ntialtechnical advancement in the area of wastemanagementsystems and IoT.

V. CONCLUSION

In most of the metro cities globally poses achallengeoneffectivewastesolidwastemanagementandm aintenance of the waste bins. Inthis work an IOTenabled Smart Waste Bin with realtime monitoring isdesigned and presented. Inaddition to the waste levelmeasurementbyusingultrasonicsensors,asensingmec hanism based onsimple parallel plate capacitance isalsodevelopedandpresented.Experimentalinvestigations arecarried out where the waste level ofthesmartbinsismeasuredusingtheparallelplatecapacitanc e and ultrasonic sensors and the statuses ofthe bins arecommunicated to the cloud effectively. Theresultsprove the efficiency of the designed smart binsqualitatively.Asmartwastemanagementsystemincorp oratingroboticsmartbins,wherethesmartbinhasthemobility tomovetothewastedockyardbylocalizing itself in the environment, is also proposedinthiswork.Thissystemcouldfindanapplicationin smart buildings where the waste management couldbepracticed autonomously in a smarter way. Ourfuturework is to investigate the performance of theproposedtraditionalandroboticwastemanagementsyste minoutdoorandindoorenvironmentrespectivelyinourInstit utional campus.

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SOIL NUTRIENT DETECTION USING IMAGE RECOGNITION AND GENETIC ALGORITHM TECHNIQUES:A STUDY

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*Abstract:*Thedemandforfoodproductionrisesbecauseofthegrowingpopulation.Toincreasefood production and to feed the rising population,farmersrequireinnovativetechniquesand technologies.Therefore,itisessentialtouseexistingtechnologytoincrease foodproduction.The fertiliser requirements vary within a field andthroughout the course of the year depending ontheseoiltypes,theenvironment,andthecropscultivated in prior years. Iron, zinc, and copper, aswell as the macronutrients nitrogen, phosphorus,and potassium, are crucial for the healthful growthofplants.Micronutrientsarerequiredinlesserquantities compared to macronutrients. The rootsnaturally draw micronutrients and macronutrientsfrom the soil. This aids in identifying nutritionaldeficiencies in plants and the amount of nutrientspresent in the soil. Therefore, we will be able tosupply it if we are aware of the deficit and thequantity of nutrients that the plant and the soil bothneeds.Themethodsusedtoidentifythenutrientsin thesoilandinplantsarethemaintopicofthisessay.This essayalsofocusesonseveralcutting-edgeandsuccessful techniques that can be used to achieveevengreaterprogress.

I.INTRODUCTION

Agriculture is one of the largest sources oflivelihoods in India. The agricultural sector itselfemploys more than 50% of the total workforce inIndia.Agriculturecontributedto19.9%oftheGDPin 2020-21. Most of the rural households dependessentially on agriculture. It is the backbone of theIndianeconomy. Nowadays,farmersaren'tabletoprovidetherequired yield due to many factors. The excessiveusage of fertilizers and the lack of proper irrigationare some of the problems faced. This paper aims todevelop a system which takes into account the soilnutrients along with the humidity level to proposeanIoTbased systemto tacklethechallenge. Soilisamixtureofweatheredrockfragments,minerals and organic matter that are on the earth'ssurface.[1] It provides a living area to countlessmicroorganisms, invertebrates, and plant roots. Itsdepth varies from a few inches to several feet. Soilprovides nutrients, water and physical support fortheplants.Micronutrientconcentrationsare

generally higher in the surface soil and decreaseswith soildepth.

II.   REFERENCEPAPERS

Soil consists of 3 macronutrients-nitrogen,phosphorus and potassium.Nitrogen not only playsa major role in crop yield, but also increases thefood quality.[2] An optimum amount of nitrogenincreasesphotosyntheticprocesses,leafarea production,leafareadurationaswellasnetassimilation rate. Phosphorus helps in the generalhealthofplantsandpotassiumregulatestheope ningandclosing ofstomata. Phosphorusisrequiredduringtheprocessofenergygen erationandtransfer,carbonmetabolism,membranesy nthesis,enzymeactivation,andnitrogenfixation.[3] Potassiumisusefulfornumerousplantgrowthprocess essuchasenzymeactivation,stomatalactivityandphot osynthesis.[4]Itisofutmostimportancethattheapprop riatelevelsofthesemacronutrients are present in the soil. Both, a lackaswellasanexcessiveamountofthesenutrientsint hesoilcanbedetrimentaltotheoverallcultivationalpro duce. Thus, a system which can make real time analysisofthesenutrientsandprocessthedatatoprovid eanestimate of how much nutrients are required for thecrops isrequired.Inthispaperwilldiscussthevarious methodologies which can be implementedfor a soil nutrient prediction system using variousparameters.

III.IMAGERECOGNITION:

Nutrients present in the soil depend on thepH level of the soil.[5] If the pH is greater than 7,the soil is said to be acidic and if it is below 7, thenthesoilissaidtobebasic.Ironcontributesthemostt othecolourofthesoil.Aredoryellowsoilindicates the presence of iron oxide. A black soilindicatesthepresenceof organic matter.

Methodology:

First, the user takes an image of the soilthrough their mobile phone. Then the image is sentto a cloud server where image processing is done.Thenecessaryinformationisreturnedtothemobi leapplicationfromwhichtheusergetsrecommendatio nsofhowmuchamountoffertilizertouseforthesoil.Thi scanalsobeanalyzedthroughinfraredspectroscopy.[6]Basicsoilcomposition,ormoreprecisely,soilorganic matter,soiltextureandsoil clay mineralogy have been in the core of mostinfrared spectroscopy research for soils. One of thegreatestadvantagesofusingnear-infraredspectroscopyforsoilanalysisisthesimple,haz ard-free sample preparation. It can be done both in thelab and in the field. Various soil properties can beestimatedfromthis.Theimagesofsoilsamplesfrom the camera are converted into a digital imagefrom which we can extract the digital values of animage. By using MATLAB, we can get the RGBvaluesfortheparticularimage.Theimageisfiltere dfrom any unwanted noises. The intensity, contrastand hue are checked to send the image to the nextlevelofprocessing.Therearecertainprocessestha tcan be used in preprocessing images. Adjusting thecontrastandthebrightnessaswellasnoisereduction aretheonesbeingconsideredinthestudy.Featureextra ctiontransformsrawdataintonumericalvalueswithon lythenecessaryinformation present so that only a small amount ofdatamustbeprocessedbyapplyingmachinelearning techniques. The soil sample images arethen resized into a common size 480x480 pixels.Interpolation can be used to enhance the quality ofimagestaken.Thisisdonebyincreasingthenumbero fpixelsforasetof pixelsinthe image.Anymissingareaslikeablurcanbereducedeffe ctively.The image is broken down into its red, blue andgreen values and image segmentation is done. Thethreshold, blue, yellow and red lines are plottedonto a graph from which the necessary values canbenoted.

[7] MATLABgivesseveraladvantages.Forinstance, MATLAB provides easy implementationand algorithmic testing without recompilation aswellaseasydebuggingwithextensivedataanalysisa nd visualization.Perhaps, the most fascinatingfeatureofMATLAB-basedimageprocessing

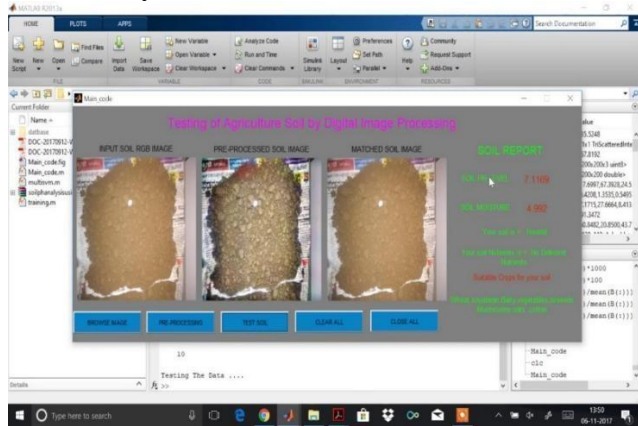techniqueisitsability tohandleerrorspriortoexecution by proposing various ways to make thecodesfaster.

Fig.1.MATLAB ImageProcessing

III. SENSORBASEDDETECTION:

Alternativetotheimagerecognition technique, sensors can be used for thedetermination of nutrient content in the soil.[8] Acost-effective and automated drip irrigation systemthatincludedavarietyofsensorssuchaslight,soil,pressure,temperature,andcolourcanbedeveloped. Each node's sensors will be connected to the I2Cbus,whichisabidirectionaltwo-wireserialbusthatestablishesacommunicationlinkbetweenthesensor and the MSP430 controller. In the MSP430controller,thesensoroutputiscomparedtopredeterminedthresholdvaluestoactivatetheappropriaterelaysandvalves.Thecontroller'soutput is also sent to the mobile via the ESP8266WiFiModule.Furthermore,theprojectaims tooptimiselandandlabouruse,conservewater,increasecropyield,avoidenergywaste,andprovidemaximum automationand societalbenefit

IV. GENETICALGORITHM:

Thegeneticalgorithmisamethodforsolvingbothconstrainedandunconstrainedoptimizationproblemsthatisbasedonnaturalselection,theprocessthatdrivesbiologicalevolution.[9]Thegeneticalgorithmrepeatedlymodifies a population of individual solutions. Thesensor-based system will be activated to determinewhethertheGA-basedsystemcorrectlypredicted

themoisturelevelinthesoil.Plantwateringisperformed by quadrotor UAV if the soil moisturelevel exceeds a predetermined threshold value. Thegrowthofaplantdependsontheclimate.Prediction of weather is always a critical job as it is dynamicand messy in nature. This GA based system is abletoidentifytheweatherautomaticallyusingmultidimensionalweatherpredictiondata.according to fitness criteria, the best result is foundfromagivensetofchoices.ThebestgenisselectedusingsectionprocedureofGAandthatgeniscalledthe fittest one. Fitness is a character of excellencewhichistobealwaysoptimumeithermaximizedorinminimizedform.InGA,parentselectionisessentialastheoptimizations'resultsdirectlydepend upon the fitness of the next generation (off-springs). In genetic algorithm, three major legacyoperations are used they are selection, crossover,andmutation.
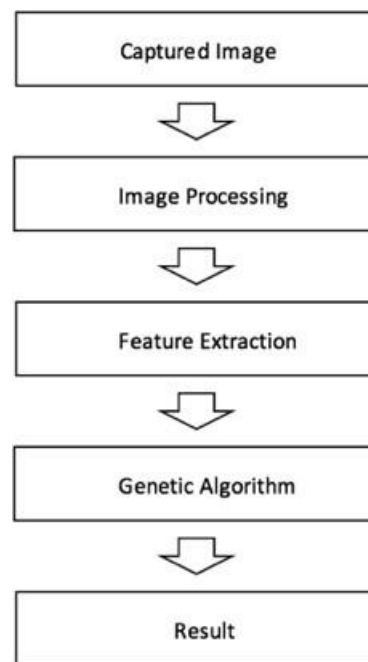

Fig.2.Flowchartfor geneticalgorithm

Methodology:
Thestages ingeneticalgorithmfollows:[10]

The captured image is subjected to imagerecognition in order to identify soil nutrients. Anysmartphoneorcameracanbeusedtotakethis

picture, which will be then edited. The amount ofnutrients present in the soil is detected after theimagehasbeenprocessedusingtheabovementione dtechniques.Imagecapturing,pre-processing,andsegmentationarethethreesubsections ofimageprocessing.Thenumerousdata sets that are available are used in the GeneticAlgorithmmethodstoforecasttheexperiment' soutcomes. Results are accurate to within 98.2609%usingthis.Nutrientlevelsinsoilcanbedeter minedusingthistechnique.Theoutcomesarethenappl iedtoforecasttheamountoffertilisrequiredtoenhanc eplant growth and development.

V.   CONCLUSION:

Useofthegeneticalgorithmandimagerecognit ion methods described in this research willbe made to determine the quantity of fertiliser thatthesoilrequires.Additionally,anymachinelearnin gordeeplearningtechniquesmaybeutilisedinconjunc tion with this.

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SUSTAINABLE SMART CITIES AND ECOSYSTEM

Combining ArtificialIntelligence, Block Chain and Internet Of Things (IoT)

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Abstract : The smart city may become an intelligentcivilizationinthedigitalagebyleveragingdevelopmentsinnewtechnologies.Specifically,theincreasingadoptionofblockchaintechnologyhasresulted in a paradigm shift toward a new digital smartcityecosystem.Awiderangeofblockchainapplicationsoffersolutionstoproblemsrangingfromriskmanagement and financial services to cryptocurrencies,and from the Internet of Things (IoT) to public andsocialservices.Furthermore,theconfluenceofArtificialIntelligence(AI)andblockchaintechnologyistransformingsmartcitynetworkdesigninordertodevelopsustainableecosystems.However,technological advancements present both possibilitiesand obstacles when it comes to accomplishing the aimofconstructingsustainablesmartcities.Thisarticlepresentsadetailedassessmentofthesecuritydifficultiesandproblemsthataffectthe adoptionof blockchainsystemsinsmartcities.Thispaperprovidesacomprehensive study of numerous essential criteria fortheconfluenceofBlockchainandAItechnology,which will aid in the formation of a sustainable smart society.Wecoverblockchainsecurityenhancementoptions,highlighting the major elements that may be used toconstructdifferentblockchain-AIbasedintelligenttransportationsystems.Inaddition,weexplainthedifficultiesthatremainunresolvedandourfuturer esearch path, which includes new security ideas andfuturestandards for ahealthysmart cityecology.

1. INTRODUCTION

Rapidurbanisationoftheworld'spopulationproducesseveraleconomic,environmental,andsocial issues that have a substantial impact on manypeople's lifestyles and quality of life. Given the highpopulationdensityinmetropolitanareas,thesmart city idea provides chances to tackle these challengesanddeliverabetterlifestylethroughhighqualityintelligent services.Information and communicationtechnology (ICT) plays an important role intheimplementationofsmartcities.Transactionsaresignedusingpublicandprivatekeysthatrelatetoeachothermathematically,andthesetransactionsaredocumented in order so that participants can tracktransactions(i.e.,digitalcurrency)ratherthanuseintermediaterecord maintenance

Informationandcommunicationtechnology(ICT)plays an im- portant role in the implementation ofsmart cities. Transactions are signed using public andprivate keys that relate to each other mathematically,andthesetransactionsaredocumentedinordersothatparticipantscantracktransactions(i.e.,digitalcurrency)ratherthanuseintermediaterecordmaintenance IoT and blockchain may be utilised tostrengthenmajororganisations'securityinfrastructure,aswellasfordataextractionandanalysis.Openledgersmaypromotefault-proofintegration of connected devices in smart networkswith blockchain IoT solutions, removing challengessuch as • data transparency and end-to-end processmonitoring.

• automatedtransactionprocessingandverification
• real-time data sharing over the network • cloud-basedIoTplatformlimitations,suchasstress-freescalability
• Analyticsof IoTdataandnetworkconcerns Statistacollectsdatafromover22,500sources,anditsstatisticsindicatetheglobalexpansionoftheblockchaintechnologyindustryfrom2016to2021,asseen in Fig. According to the data, the global marketforblockchaintechnologyreached\$333.5millionin

2017 and is expected to reach \$2.3 billion by 2021.(SizeoftheBlockchaintechnologymarketworld widefrom 2016 to2021, 2018).

The tremendous rise of the Internet of Things hascreated new community opportunities, such as waysforaccessingandsharinginformation,andopendat ais at the centre of this movement. The tremendousriseoftheInternetofThingshascreatednew communityopportunities,suchaswaysforaccessingan dsharinginformation,andopendataisatthecentreof this movement.

2.DESIGNPRINCIPLE

Thefollowingconditionsmustbemetinorderto createasustainablecitythatissafe,scalable,efficient,a nd AIenabled.

Robustenvironment:Citiesfaceunprecedentedproble msasaresultoftheconvergenceofglobalisationandurb anisation;thus,theirinfrastructuremustberesilienttoe xternalshockandensurethe sustainabilityof smartcities.

Communication technology must be interoperableand flexible in order to permit the interconnectivityofallphysicalobjects.Forexample,a nIoTplatformfor smarthomeappliancesthatcanbeoperated from anywhere while also sending homedatato acloud infrastructure(Iqbal, 2018).

Smart cities are made up of complex and diversesystemsthatstrivetostrikeabalancebetweenec onomicdevelopment,industrialisation,andenvironm entalnecessities.Behaviormonitoring:Tomodel adaptive behaviour in smart cities, computersimulations must be used. Reciprocal connectioncycles provide pattern behaviour data as a result ofthewebofgoing,whichisexpressedintheinterplayof economic, social, and physical systems, whichconstitutethenetworks of networks.

Energysourcesanddistribution:ensuringthequality of energy supply and renewable resourceshas become anessential demand. As a result,adistributive technology should be implemented intheelectricalgridsystemaswellasinotherdomains.

Intelligent infrastructure: To create a sustainablesmartcity,allpersonsmustcollaborate,whi chintelligentsystemsenable.

Scalability:Smartcitiesaremadeupofalargenumber of hardware and software components, andmany services provide their inhabitants the capacityto gather and analyse real-time data through theirinfrastructure. As a result, for sustainable cities, adistributedIoT-blockchaincloudinfrastructureisnecessary.

Smart healthcare: As ICT brings together big data,smartsystems,andcutting-edgecriticalanalysis,theglobalcity mayassist thehealthcarebusiness.

Secure infrastructure: In order to protect networksanddatafromvariousdangers,hostileactivity monitoring, authentication, entity authorization, andother network control rules should be designed inordertosecureanddefendthesustainablesmartcity.
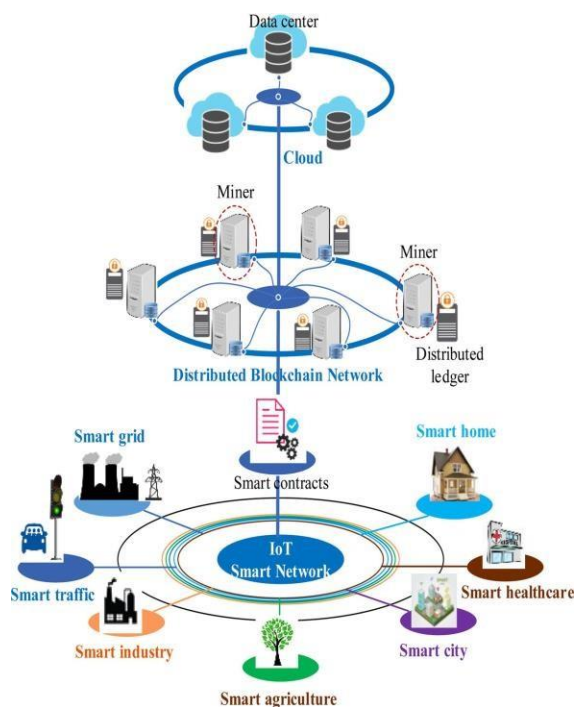
**Distributedblockchainbasedsmartcitynetwork**

IntelligentinfrastructureinSmartCity

1) Transitmanagementincludeusingautomaticvehiclelocationtechnologyandcomputer-aideddispatchsystemstoenablecarsarriveontime and provide better service. It assists thebussystemwiththetrafficsignalsystematcity crossings.Thesetechniquesemployaroutegenerationdesignalgorithm(RGA),whichcreatesseveralsetsofroutesthatcorrespondtothe various trade-offs required to decrease triptime.BaajandHadi(Baaj&Mahmassani,1992) created an artificial intelligence searchmethodfortheconstructionandstudyoftransitnetworks. AI search technique has the benefitofefficientlydescribingtransportnetworkdesignproblems(TNDP)andexecutingsearchesutilising alistdataformat.
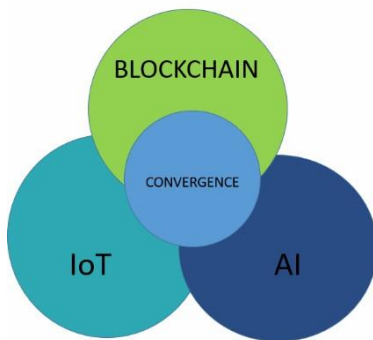
2) **Travelerinformation**:TravelAdvisorySystems(TAS)areutilisedtoprovidetravellerswithtransit updates.Throughon-board computers, these systems offer severalcommunicationchannelsthatgivereal-timeinformationsuchasjourneytime,travelspeed,dial-up service delays, road accidents, changeofroute,diversions,andworkingareaconditions.Theintelligentsystemdeliversefficienten-routeinformationtotravellers,andthe data is available in both public and privatedatabases.

3) **Scalability:**Totacklethecomputationaldifficulty forpermissionlessblockchain,thedistributed ledger system must be scaled up.Scalability has surfaced as a critical challengeinsmartcities,withanincreaseintokens,users,investors,exchanges,andcompanies

(Llacuna & Llusa, 2018). Confirmingtransactionswithbigvolumesofaggregateddatanecessitatesalotofcomputer power,fastspeeds,andalotofotherthings.Someof themost significant difficulties are as follows:Laddertradeshavelimits.Issuesexpressedbyminers charging high fees for favouredtransactionsaboutblockdatasizeandreactiontimeinpeer-to-peerverificationcast

4) **Efficiency:**Thereisatrade-offbetweenblockchainefficiencyandnotrelyingontrustworthy third parties. Efficiency is amajorconsiderationforblockchainsystems,whichrequireextremelystringentverificationtogeneratetransactionrecords.Thistakesasignificantamountoftimeandconsumescomputationalresources.Complexcomputersystemsfortransactionverificationarelessefficient than systems that rely on the judgementof the authorised network node, but not everyonein the network must agree to trust a certain party:This is a benefit of this type of computer system.Increasestheefficiencyincreasesthetimeconsumingprocess.

☐ **"Wireless Sensor Network Based AutomatedIrrigation and Crop Field Monitoring Systemandschedulingsystems"**

Paper Originators: G Nisha and J Megala.Wireless sensor Network based automatedirrigationsystemforoptimizewateruseforagriculturalpurpose.Thesystemconsistsofdistributedwirelesssensornetworkofsoli-moisture,andtemperaturesensorsplacedinthecrop field.TohandlethesensorinformationZigbeeprotocolusedandcontrolthewaterquantityprogramming usinganalgorithmwiththreshold values of the sensors to amicrocontrollerforirrigationsystem. Thesystemhas powered by solar panel and Cellular-internetinterfacefordatainspection.Awirelesscameraisfixedincropfieldtomonitorthediseaseareausingimageprocessingtechnique.Thesystemislowcost and energyautonomy usefulin waterlimitedgeographicallyisolatedareas.

2.SURVEYAND CONTRIBUTION :

Researchers have recently focused on theseconcerns,difficulties,andissuesarisingfromblockchain systems and their integration with IoTand cloud systems (Conoscenti, Vetro, & Martin,2016).TheauthorsofB-IoT:BlockchainTechnologyforIntelligentDevices(TransportationSystems,2019)coveredB-IoT,orblockchaintechnology for Internet of Things (IoT)-enabledtransportation systems. (Polina et al., 2018) talkedofcombiningblockchainwithcutting-edgeAItechnologies to decentralize and speed up medicalresearch.Thediscussionofsomepotentialsolutions for more secure surroundings as well asthedifficultiesthatblockchaintechnologypresents intermsofsecurity

andprivacy.Theprospectsforsecurityandprivacywerespecificallyexplored,aswellasthemanydifficultieswithconsensusmethods.Additionally,thewriterstalkedaboutpotential developments in blockchain technology.Anartificialneuralnetwork-basedsolutionforenergy-efficientlightinginsustainablesmartcitieswassuggestedbyMohandas,Dhanaraj,andGaoin2019.Theideawasputintopractiseinaresidentialneighbourhoodandevaluatedthroughoutallcircumstancesandseasons.Thesuggestedmodulemakeseffectivedecisionsfordemand-basedusageandenergyconservationbyutilisingtheanalyticalelementsobtainedfrommultiplesensors,theneuralnetwork, and fuzzylogiccontroller.

3.TECHNICAL   AND BUSINESSCHALLENGES:

Smart city infrastructure must be agile and easy toimplement in which many places the smart citycameintoeffectandalsoleadstosustainablesmartcity and ecosystem. Infrastructure would be themain challenge in various places. Since it is socomplexandrequiresmanycomplicatedchallenges to adopt thecondition.

Initiatives like smart energy management, smartwatermanagement,smarttransportation,smart healthcaresystemandmanymoreshouldbelaunchedinordertoconstructphysicalinfrastructure.   Finding renewable energy sources,deployingcutting-edgemetres,andutilisingcontemporarytechnologyto automateandmonitor

the distribution of power are important for smartenergy management. Reduced energy costs and theeffects of global warming are the goals of smartenergymanagement.However,efficientwater management will deal with the problems of waterpurificationandscarcity.Watershortage-proneplaces may be able to get clean water with the   useofcutting-edgetechnologiesforbetterwatermanagement.Smart mobilityseekstoprovidemoreaffordable,   quicker, and   environmentally   friendlytransportation options. AI and CCTV cameras mayalso be used to discover   open   parking   spaces andimprovetrafficmanagement.

Intelligent healthcare and intelligent education arecrucial for building the social infrastructure. Smarteducation makes use of cutting-edge tools like IoTandartificialintelligencetoprovideimprovedlearning environments. Automated processes canbe used to create specialised learning interfaces fordigital textbooks and grade assessments. IoT mayalsobeusedtotrackattendanceandcreateaninteractivelearningenvironment.Patientinformation   is gathered for online health records,patient monitoring systems, remote diagnosis, andtherapy.

Keyelementsoftheeconomicinfrastructureincludebusinessparksandskilldevelopmentcentres.   Students and employees are trained at skilldevelopment

centres to increase their competenceand dependability so they may contribute to theexpansionof companiesand workplaces.

Private and public sector needs to contribute makethissustainablecities.Obtainingfinanceisthem ainobstacletoputtingasmartcityplanintopractise.In order to utilise digital technologies, sophisticated,complicatedinfrastructuremustbedep loyedincities.Additionally,amassivenumberofsma rtdevices must be interconnected for data collecting.Governmentsmusttorecruitanadequaten umberofcomputerspecialistsandurbanplannersifth eywantsmart cities to succeed.

Additionally,networkneedsmustbeproperlyaddres sed.Furthermore,regularauditsformaintenance must be performed on the installedhardware.Theseallcostalotofmoney.Gove rnmentshavetothinkaboutdevelopingaplan

to develop suitable income streams for their smartcityefforts.

Numerous sensors, cameras, and actuators havebeenputallaroundatownforsmartadministratio n. These sensors collect and transmitmassive amounts of data instantly. For effectiveadministrationofcityoperations,theacquir eddatashouldbeanalysedandprocessedveryimmedi ately.Additionally,high-speedInternetaccess is necessary for fast processing. There arenow 4G mobile coverage networks, although theyareinsufficientforhigh-speeddatatransfer.Therefore, it should be required that this topic beconsidered.

Massive amounts of data will be sent instantly bytheseInternet-connectedgadgets.Althoughthisinformationhelps municipalitiesoperatemoreefficiently,italsoposessi gnificantsecuritythreatsthat must be disregarded. Private information onresidents is collected through parking lots, CCTVcameras,ElectronicVehiclechargingstations ,andGPSdevices.Currently,noteverylinkeddeviceis cyber-resilient.Ifso,itwouldbesimpleforcriminalstoacquir ethedataandutiliseitinviolationofthelaw.Governme ntsandITspecialistsshouldthustightenthesecuritype rimeterssurroundingsmartdevicesandtheenablingi

nfrastructure.

CONCLUSION:

The project introduces wireless technology,IoT and Artificial intelligence in the agriculturalsector.Itreducesmanuallaborandcanwork inanytypeofweatheraswellasworkcontinuouslyunali ke humans. The time required to perform fivetasksissignificantlyreducedcomparedtoperformi ng the same tasks manually. It is designedto help farmers reduce their workload and increaseproductivity with its many functional features suchas automatic planting system, automatic irrigation,automaticcrop cuttingetc.

This Ag-Rpver project is being implemented withsimulation and computer hardware. It connects viaWi-Fiwiththeoperatorandwiththeroverwhichis implementedallovertheland.AgriBothasacompletew orkingareaduetoitsshapeandstructure.Differentopera tingmodeshavebeenfoundtocontrol its movement, transmitting signals using aWi-Fi module and with the help of Iot and Artificialintelligence, a large number of robots are assembledin a distributed and decentralized way. This basicdesignof autonomousrobotscanbe transformedwith few changes and can be built to cover a largeareaoflandforefficientagriculturalactivities.

Bybuildingthisroboticvehiclewithitsmanyagricultura l features, it overcome the difficulties offarmersincultivatingtheirlandatalltimesoftheyearn o matter what the weather on that day. Consideringallthecircumstances,arobotintegratedwit hdifferent small modules can be used for rescue andagricultural purposes around the world especiallycountries like India where agriculture provides themainlivelihoods oflarge Indianpopulations.

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To Overcome Host Location Hijacking Attack And Link Fabrication Attack Using SDN-Based Topology

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ABSTRACT

A new networking paradigm called Software-Defined Networking (SDN) gives a controller and its applications omnipotent control over the network and flexible network programmability, enabling new developments in network protocols and applications. One of the main benefits of SDN is its logically centralized control plane, which many SDN applications rely on to provide the full network visibility. We provide novel attack vectors specific to SDN for the first time in the literature, which constitute a major threat to this foundation. Our novel attacks have certain characteristics in common with spoofing attacks in legacy networks (such as the ARP poisoning attack), but they differ significantly in how they exploit particular weaknesses due to the way that current SDN functions differently from legacy networks.

The network topology information, a crucial building ingredient for core SDN components and topology-aware SDN applications, can be effectively contaminated by successful assaults. The upper-layer Open Flow controller services and applications may be completely mislead due to the tainted network visibility, which might result in major hijacking, denial-of-service, or man-in-the-middle assaults. All of the major SDN controllers now available on the market, such as Floodlight, Open Daylight, Beacon, and POX, are susceptible to Network Topology Poisoning Attacks, in accordance with our analysis.

1. INTRODUCTION

1.1   SOFTWARE   DEFINED NETWORKS

software defined networks By separating the control plane from the data plane (such as switches), as well as by offering comprehensive network visibility and flexible programmability, Software-Defined Networking (SDN) has developed as a new network paradigm to revolutionize the ossified network architecture. A SDN controller, which acts as the brain of the network, gives users excellent design and control tools. * The first two writers each had an equal contribution to the project. the network utilising their own apps on top of the essential functions provided by the controller. SDN, especially its well-known realisation OpenFlow1, has been used more and more not just in academic settings but also in actual commercial networks.Since then, several application scenarios, including campus network innovation, cloud network virtualization, and datacenter network optimization, have been researched and implemented. Since the controller is at the centre of the SDN architecture, if the OpenFlow controller has any significant design or implementation flaws, the entire network might get completely out of control.We investigate the network topology services and applications of the common OpenFlow controllers and discover a number of fresh vulnerabilities that a hacker may use to taint the network topology data in OpenFlownetworks.One of the significant breakthroughs offered by SDN in comparison to older networking technologies is the ability to see the whole network.The topology information is included into the majority of controller core services and upper-layer apps as a key building element for network management, such as those involved in packet routing, mobility tracking, and network virtualization and optimization.However, if such essential network topology data is tainted, all reliant network services would be adversely affected right away, leading to catastrophic issues. For instance, a man-in-the-middle attack or black hole route might be constructed by manipulating the routing services/apps inside the OpenFlow controller.

1.2 SHORTEST PATH ON SDN ENVIRONMENT

Rapid residential broadband adoption widens the income and expense gap for Internet service providers (ISPs). The expansion of Internet-enabled gadgets is

also straining access networks, lowering end-user satisfaction, and impacting content providers' ability to monetize. Using open APIs enabled by software defined networking, we suggest a novel approach in this study where the content provider directly communicates the fast- and slow-lane needs to the ISP on a per-flow basis (SDN). Our initial contribution is to provide an infrastructure that supports this approach, outlining the advantages for customers (better user experience), ISPs (dual revenue), and content creators (fine-grainedcontrol over peering arrangement). Our second contribution is to evaluate our proposal using a real trace of over 10 million flows to demonstrate that the use of dynamic fast lanes can almost completely eliminate the degradation of video flow quality, and the use of slow lanes for bulk transfers can significantly reduce the loading times for web pages. In order to show the viability and performance advantages of our strategy, we've created a fully functioning prototype of our system utilising open-source SDN components (Open flow switches and POX controller modules) and instrumented video/file-transfer servers. Our suggestion is a first step towards implementing open and flexible network service quality management that is acceptable to customers,

Internet service providers, and content suppliers a like. FIXED-LINE Residential data consumption is expanding at a 40% annual rate, which is putting more financial strain on Internet Service Providers (ISPs) and driving up the cost of the infrastructure needed to carry the growing volume of information. However, due mostly to "flat-rate" pricing, sales are only expanding at a pace of less than 4% annually. ISPs have tried throttling specific services (like peer-to-peer), which sparked public outcry (resulting in "net neutrality" legislation), and now routinely impose usage quotas, which can stifle the delivery of innovative content and services, in an effort to close this widening gap between cost and revenue. The need to rethink the business model in order to enable ISPs to utilise the service quality dimension (in addition to bandwidth and download quota) in order to differentiate their offerings and open up new revenue opportunities is becoming more widely acknowledged as a necessity for ensuring the sustainable growth of the Internet ecosystem.

2. LITERATURE SURVEY

2.1 PUTTING HOME USERS IN CHARGE OF THEIR NETWORK

In this research study, YiannisYiakoumis makes a proposal. The fight about who should have control over the Internet traffic that enters our homes is raging among policymakers, ISPs, and content producers. In this essay, we make the case that the user, not the ISP or the content provider, should choose how traffic to and from the home is prioritised. Home users are the ones who are most aware of their preferences, and if they can communicate these preferences to the ISP effectively, both parties will benefit. In order to put the concept to the test, we created a prototype that enables users to specify high-level preferences that are then converted into low-level semantics and utilised to manage the network. Modern households depend heavily on their home networks, and as the number of connected gadgets and services increases, so does our reliance on the reliability of our home Internet connection. We anticipate a quick, always-on, dependable, and responsive network. Simply put, we do not want our home apps to be hindered by the network. With video streaming, video chat, VoIP, gaming, and cloud-based backup becoming more and more prevalent, we put a growing amount of pressure on our home network. The volume of traffic on residential networks has surged by 50% over the last year (from 7:0 GB permonth to 10:3 GB). Our apps frequently cause congestion and poor user experiences as they compete for the last-mile connection. Internet service providers (ISPs, supplying cable or DSL) still struggle with how to divide the available bandwidth among consumers' apps while making significant progress in the bandwidth supplied to the house. Many ISPs recently implemented divisive data limitation plans and barred traffic-heavy applications, igniting a fierce discussion and escalating concerns that ISPs may attempt to limit the applications we use.

2.2 SLICING HOME NETWORKS

YiannisYiakoumis has proposed in this article work Home networks are widely used, although they have a number of structural issues: Home networks are becoming more difficult to manage as we connect more devices, use new applications, and rely on them for entertainment, communication, and work. It is common for home networks to be poorly managed, insecure, or just plain broken. Additionally, it is unclear how home networks will steadily improve after they have been deployed to provide steadily better service. In this study, we suggest home network slicing as a solution to these issues. Multiple

service providers can use a single infrastructure thanks to the process of "slicing," which also offers a variety of cost-sharing strategies and commercial models. We suggest four needs for slicing home networks: autonomous management of each slice, bandwidth and trac separation between slices, and the capacity to change and enhance a slice's behaviour. We investigate how these demands enable cost-sharing, outsourced home network maintenance, and the capacity to tailor a slice to offer higher-quality service. We conclude by describing a preliminary prototype that is being used in households. A contemporary home must have a network within the house as well as broadband access. Numerous household appliances have Internet access, and high-bandwidth Internet services including streaming video and audio, high-definition video conferencing, file sharing, and backup are increasingly widely used. However, despite significant expenditures in broadband and more than ten years of home WiFi experience, home networks continue to confront a number of structural issues.

2.3 TOWARDS NEUTRALITY IN ACCESS NETWORKS: A NANDO DEPLOYMENT WITH OPENFLOW

Jon Matias has offered a concept in this paper work [3]. The next stage of access network development provides a scenario where fair competition between service providers is made possible by sharing access infrastructure. Currently, a scenario like this is encouraged by regulatory factors or CAPEX savings. Customers, service providers, and network operators are now included in the positive feedback loop due to the addition of neutrality. A novel layer 2 technique for neutral access networks is implemented by the NANDO project. This NANproposal contains a prefix-based forwarding strategy, a safe service instantiation method, and a network operator selection mechanism (Ethernet-PF). The implementation of OpenFlow technology has been chosen. The flow table of a switch, which controls the forwarding process, may be controlled or modified by an external entity (controller) via the OpenFlow protocol. The NANDO scenario and the most important OpenFlow implementation details are covered in this article. Additionally, a thorough explanation of the created controller and its operational model are displayed together with several illustrative examples. In a scenario where different operators use the same physical

infrastructure for service delivery, the functional viability of NANDO is verified.

2.4 BWE FLEXIBLE, HIERARCHICAL BANDWIDTH ALLOCATION FOR WAN DISTRIBUTED COMPUTING

Alok Kumar suggested that WAN bandwidth remains a restricted resource that is economically unviable to significantly overprovision in this paper study . Therefore, it is crucial to assign capacity depending on the importance of the service and the added value of increased allocation. For instance, one service could be given the highest priority to acquire 1 Gb/s of bandwidth, but once this amount has been allocated, the incremental priority may quickly decline, preferring distribution to other services. We propose the design and implementation of Bandwidth Enforcer (BwE), a global, hierarchical bandwidth allocation infrastructure, which was inspired by the notion that individual flows with ûxed priority may notbe the optimal basis for bandwidth distribution. A service can represent any number of flows, and BwE supports service-level bandwidth allocation based on prioritised bandwidth functions, independent allocation and delegation policies based on user-defined hierarchies, multi-path forwarding that is common in

traffic engineered networks, and a central administrative point to override (possibly flawed) policy under exceptional circumstances. For many years, BwE has provided production with more service-efficient bandwidth consumption and easier control. The Internet has long benefited from TCP-based bandwidth allocation to individual flows competing for capacity on bottleneck lines. However, this bandwidth allocation model makes the assumption that each flow has an equal priority and benefits equally from any increase in the amount of available bandwidth. It implicitly presupposes a client-server communication architecture in which a TCP flow encapsulates an application's communication requirements when it communicates over the Internet.

2.5 TIME-DEPENDENT BROADBAND PRICING: FEASIBILITY AND BENEFITS

Carlee Joe-Wong has proposed in this paper study Users are induced to spread out their bandwidth use throughout different periods of the day when different costs are charged for Internet connection at different hours. The issues at hand are its viability and potential value. Using both a static session-level model and a dynamic session model

with stochastic arrivals, we create an effective method for computing the cost-minimizing time-dependent pricing for an Internet service provider (ISP). The representation of the optimization issue must be chosen carefully such that the formulations that arise are computationally tractable for large-scale situations. The utility and restrictions of time-dependent pricing are illustrated in the following scenarios. These findings show that the demand for each period closely correlates with ideal rates, which "reward" customers for postponing their visits, and that adjusting prices based on real-time traffic predictions may dramatically save ISP costs. The portion of traffic not subject to time-dependent charges, the cost structure of the ISP, and the time-sensitivity of sessions all affect how evenly distributed traffic is throughout the day. Finally, we demonstrate the proof-of-concept experiment and our system integration and implementation, named TUBE.

3. EXISTING SYSTEM

A network's resilience of connectedness to other networks is frequently greatly reliant on a small number of crucial nodes and links that connect it to the broader architecture. Such network bottlenecks can break or

degrade, causing outages that might spread over the whole network. However, the existence of bottlenecks also presents opportunity for targeted link flooding assaults (LFAs). To combat LFAs, researchers have put forward a fresh and promising defence known as topological deception. Software-Defined Networking (SDN), a new programmable network architecture, separates the control plane from the data plane in existing systems. Complex network operations including computing a routing path, observing network activity, and controlling network access control are produced by an SDN application in the control plane.

4. PROPOSED SYSTEM

To offer automated and real-time detection of network topology exploitation, this project proposes Topo Guard, a new security addition to the current Open Flow controllers.To stop the Host Location Hijacking Attack and the Link Fabrication Attack, Topo Guard uses SDN-specific capabilities to examine precondition and postcondition to confirm the validity of host migration and switch port property. We examine potential defence tactics for TopoGuard (Topology Guard) in order to lessen the impact of such attacks. We point

out that it is challenging to simply use static configuration to solve the problem (similar to using static ARP entries for hosts or the port security feature for switches to solve ARP poisoning attacks) because it requires time-consuming and error-prone manual work and is unsuitable for handling network dynamics, which is an important innovation of SDN. In this project, we propose TopoGuard, a new security addition to the current OpenFlow controllers to allow automatic and real-time detection of network topology exploitation. This would help to better balance security and usability. To stop the Host Location Hijacking Attack and the Link Fabrication Attack, TopoGuard uses SDN-specific capabilities to examine precondition and postcondition to confirm the validity of host migration and switch port property.
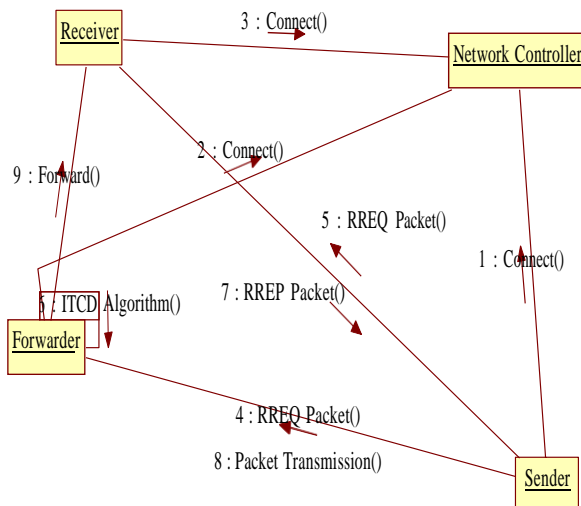
4.1 ALLOCATION OF TRAFFIC ACROSS MULTIPLE ROUTING PATHS

This module is used to solve the lossy network flow optimization problem of traffic distribution over different routing channels when there is poison present. Portfolio selection theory, which enables individual network nodes to quantify the poison impact locally and aggregate this knowledge for the source nodes, is used to relate the optimization issue to that of asset allocation. We do the SDN/OpenFlow Topology Management Service's first security investigation. We have specifically found new flaws in eight existing popular SDN/OpenFlow controllers' Device Tracking Service and Link Discovery Service.

4.2 CHARACTERIZING THE IMPACT OF POISIONING

The source node to use these estimations in its traffic allocation, the network nodes in this module must estimate and characterise the influence of position. A source node must evaluate the impact of pollution on transmissions across each connection in order to include it in the traffic allocation issue. The local estimates must be updated often in order to account for the jammer's

movement and the dynamic consequences of the poison attack. To take advantage of the flaws we have identified, we propose Network Topology Poisoning Attacks. We use a hardware SDN testbed and the Netbeans emulation environment to show the viability of various assaults.

4.3 EFFECT OF JAMMER MOBILITY ON NETWORK

The capacity in this module denotes the maximum number of users with min-max scheduling that may be sent over the wireless network. While the source is producing data with a high packet delivery rate, it should be communicated when the poison is happening. The throughput rate would then decrease. If the source node is made aware of this impact, the traffic allocation may be altered to reduce the delivery ratio on each path, recovering the poison path.

4.4 ESTIMATING END-TO-END PACKET SUCCESS RATES

In order to choose the best traffic allocation, the source must estimate the effective end-to-end packet success rate for each link in a routing path. assuming that the overall amount of time needed to send packets from each source to the appropriate destination is minimal compared to the update relay

period. We examine the available protection options and suggest automated countermeasures to Network Topology Poisoning Attacks. We also provide TopoGuard, a prototype defence system that is presently implemented in Floodlight but is readily expandable to other controllers. Our analysis demonstrates that TopoGuard only adds a minimal performance overhead.

5. CONCLUSION

The Poisoning Network routing has been created in such a methodical way that it is inhibiting the growth of traffic. Coding is done simply because it is more versatile and comprehensible. The poision aware traffic allocation formulation is used to assess the impact of changing network and protocol settings and to track performance trends. We are particularly interested in how the maximum number of routing pathways and the update relay period affect the effectiveness of the flow allocation.

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To trace nearby ambulances using GPS Single-point locating method

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I.ABSTRACT

The primary technology of GPS-based vehicle tracking improved public service. Android phones are now widely used and have sold the most globally due to their enormous feature set. System for precisely locating the user's location and the location of the ambulance driver. Because the ambulance is unable to reach them in time, approximately 33,000 people die. That is not required when calling an ambulance. You will be rescued by the nearest ambulance. A model for using the global positioning system to locate the nearest free ambulance in the area and bring it to the person in distress is described in the paper. The ambulance's GPS (Global Positioning System) unit will calculate the coordinates of each position and can be retrieved whenever the server requests it. As a result, it is able to locate the nearest ambulance and bring it to the injured person. Utilizing a GPS transceiver system to determine the vehicle's current location, the purpose of a tracking system is to manage the control transport system.

Index Terms - Medical health monitoring, Ambulance, Android application programming interface, GPS module.

II. INTRODUCTION

Instauration of mobile devices gave birth to lot of innovative technology, and exchanging information globally has become more prominent. Smart phones gave a new dimension to the usage of mobile phones for the users. Apart from basic functionality such as messaging, calling and cameras, smart phones laid a way to portray a personal computer. Not only the mobile phone looks newer, it's the operations system and the applications which are built to meet the various features of the hardware made difference.

The mobile phone has now become a major source of information device which can be seen almost in everyone's hand in the world. Mobile devices with computing process ability have been widely used to access network via mobile communication network. Different categories of application such as games, social networks, and health care are being developed to meet the user's requirements. Each mobile user is of unique kind, one wants to use the basic functionality of the smart phones, the other want to use the built in application, the most advanced user who wants to play with the hardware and to develop his own customizable application. To answer each kind of user, Google mustered up a ground breaking product called as "ANDROID", which includes an open source operating system, middleware and a user-interface.

Mobile communication allows transmission of voice and multimedia data via a computer or a mobile device without having connected to any physical or fixed link. Mobile communication is evolving day by day and has become a must have for everyone. Mobile phones are gradually reducing the problem in communication and many day to day life application and other services anywhere and anytime. There are a lot of applications like call management and others but this application which is android based is more customized and most simplified of all. All kinds of security and authentication is provided in this application so that only appropriate user can make changes or handle the application. Also there is no such application available in android having multiple modules working together. This application is basically designed for android mobile phone users. In this application all the features that a mobile phone user need for easy and reliable communication are provided. Also we have chosen Android

platform because Android has lots features that other mobile operating systems don't have. The basic difference between the android operating system and other system is that android has Dal vik virtual Machine. Also it using very light weight database known as SQLite. That will help it to speed up the performance. In android you can open multiple screens and can easily switch between one another. 'Intelligent Communicator' is an application developed on the Android platform for android mobile phone users. This application uses Android as its base along with GPRS, GPS and GSM services. It may happen that you don't want to receive calls/messages from a particular person; our application allows you to do so automatically. It also may happen that you are be busy somewhere and not able to receive a call from a particular person. In such a case this application automatically sends predefined message to that particular person. You can also save remainders for sending messages to particular person on a particular day at a particular time. While you are on a trip and need to inform your dear ones about your whereabouts, you can do so using our application. Our application would use GPS and track your location (Exact area) and send message of the same to your dear ones on a regular interval.

Ambulance Tracking and Task Management System is a special solution for the management of the ambulances on the mobile environment by tracking, task assignment and obtaining Patient Location from Driver End. System enables faster and efficient use of the resources by quick registering the information related with the patients and their relatives/friends/Somebody else, searching and locating the patient address on the digital map to help saving lives. Thus, resources can be used in the most efficient way and the service quality can be upgraded. Introduction of Smart phones redefined the usage of mobile phones in the communication world. Smart phones are equipped with various sophisticated features such as Wi-Fi, GPS navigation, high resolution camera, touch screen with broadband access which helps the mobile phone users to keep in touch with the modern world. Many of these features are primarily integrated with the mobile operating system which is out of reach to public, by which the users can't manipulate those features. Google came up with an innovative operation system termed as ANDROID, which is open system architecture with customizable third party development and debugging environment which helps the user's to manipulate the features and to create their own customizable applications. In this thesis, Emergency Based Remote Collateral Tracking System" application using Google's Android Mobile Platform is addressed. Emergency is divided into three categories: heart beat based emergency, security threats like personal safety and road accidents. This application is targeted to a person who is driving a vehicle. Heart rate monitoring device is integrated with our application to sense the heartbeat of a person driving the vehicle and if there is any abnormalities in the heart beat, then our application performs a dual role. One in which,

application uses a GPS to track the location information of the user and send those location information as a message via SMS, email and post it on Face book wall Simultaneously, an emergency signal is sent to Microcontroller.

III. LITERATURE SURVEY

There are no subscription fees or setup charges to use GPS [1]. GPS was invented by the U.S. Department of Defense (D.O.D) and Ivan Getting, at the cost of twelve billion taxpayer dollars. The Global Positioning Sys-tem is a satellite navigational system, predominantly designed for navigation. GPS is now gaining prominence as a timing tool [2]. Eighteen satellites, six in each of three orbital planes spaced 120º apart, and their ground stations, formed the original GPS. GPS uses these "man-made stars" or satellites as reference points to calculate geographical positions, accurate to a matter of meters. In fact, with advanced forms of GPS, you can make measurements to better than a centimeter [3]. GPSs are very quickly becoming a standard in most new automobiles, and are even finding their way onto a variety of new cell phones. The mapping devices can come in handy under a variety of circumstances. If we are thinking about purchasing a GPS or a device that has a GPS built-in, here are some of the benefits of having one [4]. A GPS can help us to determine exactly where we are at any given moment. Not only can a GPS give us the name of the street we might be traveling on, but many GPS systems can also give us the exact latitude and Longitude of where you are located. On the other hand, Android mobile platform is becoming more popular to the users for its multi-dimensional purposes. Thus, this proposed system namely "GPS-based Location Tracking System via Android Device" uses GPS and any mobile phones having an Android operating system to track the location of a person whenever necessary. An Improved A* Algorithm Applicable for Campus Navigation System[5]. With a increasing number of College Admissions activities, education and search heuristic for real time ambulance relocation[6]. This paper considers the redeployment problem for a fleet of ambulances. This problem is encountered in the real-time management of emergency medical services. A dynamic model is proposed and a dynamic ambulance management system is described. A Novel Emergency Vehicle Dispatching System[7]. One of the main issues in the event of a major industrial disaster (fire, explosion or toxic gas dispersion) is to efficacy manage emergencies by considering both medical and logistics issues. From a logistics point of view the purpose of this work is to correctly address critical patients from the emergency site to the most suitable hospitals.

IV. PROBLEM STATEMENT

There are four major smart phone operating systems which rule the mobile world namely, Symbian, Windows, iPhone OS and Android. Out of them, Android is a new and

yet dynamically developing mobile platform and almost all counterpart of application are being adopted to compact the system's requirement. GPS is one of the notorious applications. The use of GPS on mobile devices in the recent generations of mobile communication is one of the ubiquitous applications that are widely developed and used. But using those GPS in case of emergency where there is no user interaction will be an arduous effort and hence ANDROID can answer for this, by developing an application which can solve the above mentioned problem.
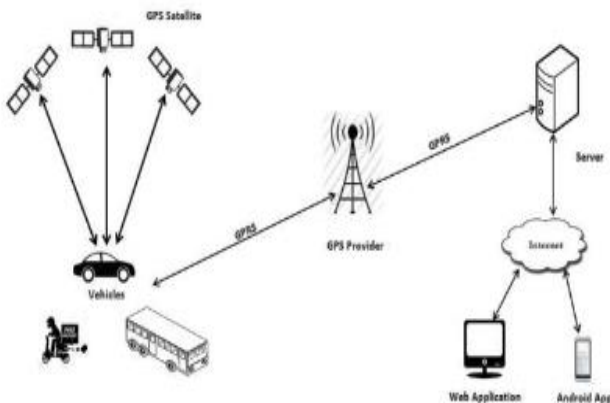
V. ALGORITHM

GPS Single Point Positioning Algorithm:

Originally, GPS has been designed to perform single point positioning (SPP). SPP use code measurement to perform absolute positioning, in real time or in post processing, in kinematic or static mode.

The ionospheric and tropospheric errors are corrected using models. Usually, the coordinates and clock error are computed from code, it is "mass-market" positioning technique.

In single point positioning coordinates of a receiver at an "unknown" point are sought with respect to the earth's reference frame by using the "known" positioning of the GPS satellites being tracked. GPS system based on pseudo-range measurement. And there is four unknown parameter. But the navigation observation equation is nonlinear. The nonlinear equation can be solved by least square iterative algorithm. The algorithm is based on linearization by taylor model.
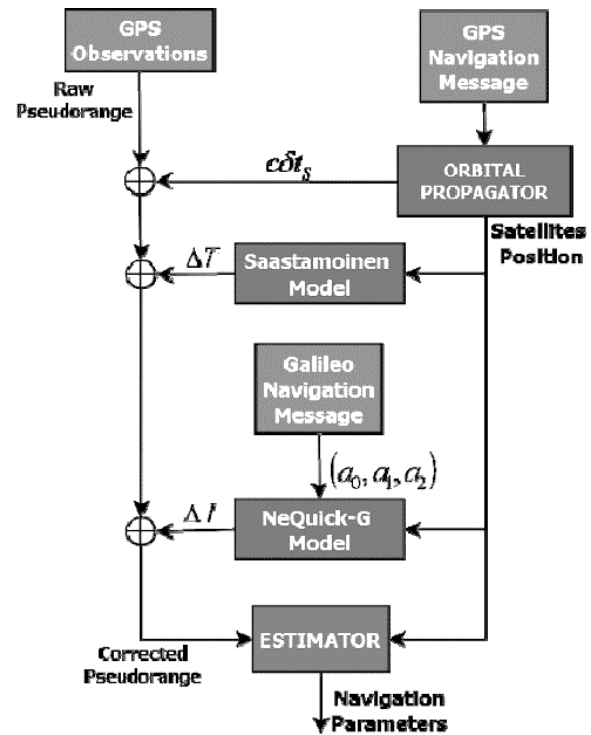
A. Block Diagram

The Accident place can be located by the ambulance driver by the GPS provider from the place where the place stored by server. The server can find the location with the help of GPS satellite.

The GPRS (General Pocket Ratio Services) can send the signal to the where the emergency location to accessed by the satellite.

B. Working

Some of you may wonder why ambulance tracking is so important. But actually 10-second delay may decide the life or death of a person. We are familiar with the concept of an emergency ambulance, an ambulance which is used to move patients rapidly to critical care in an emergency room under required medical condition. They can also be used for routine transport of non-urgent cases, such as transfers between hospitals and nursing homes and accidents. In most nations, ambulances are given priority on the road, in recognition of the fact that time is important when moving a critically ill or seriously injured patient. So Ambulances are critical tools in helping EMTs and other trained first responders not only quickly arrive at an emergency but also provide potentially life-saving measures.

VI. MODULES

1. Transmitting Unit:

Transmitting Side contains Android mobile which has inbuilt GPS, GSM modem and GPRS functionality. Therefore the mobile will be used as transmitting unit.

GPS stands for Global Positioning System. The Global Positioning System (GPS) is a satellite radio navigation system developed by the Department of Defense (DoD) owned by the United States Government (USG) and operated by the United States Air Force (USAF). GPS has

provided positioning, navigation, and timing services to military. An unlimited number of users with a civil or military GPS receiver can determine accurate time and location, in any weather, day or night, anywhere in the world. The system makes use of a medium earth orbit satellite constellation transmitting microwave signals allowing a GPS receiver to determine its position, velocity and time. Different types of positioning can be carried out using GPS receivers depending on the algorithms; type of measurements and corrections used in the navigation solution. GPS is a main module in this Vehicle tracking system. As vehicle is tracked using GPS technology. Author has used it to get the exact location of respective vehicles. But to get exact location of any vehicle it need to be in a focus of four satellites.

GSM is a Global System for Mobile Communications. It is developed by European Telecommunications Standards Institutes (ETSI).It describes the protocol for Second Generation digital cellular networks. A GSM modem is wireless modem that works with a GSM wireless network. It behaves like a Dial-up modem. The working of GMS modem is based on commands; The Commands always start with <AT> (Attention) and finish with a <CR> CRacter. The AT Commands are given to the GSM Modem with the help of PC or Controller. In Vehicle tracking system author is using GSM service for communication between all three modules.

2. Monitoring unit:

Monitoring unit is an Android Application through which user will get to know the actual position of proposed vehicles. This android provides the user interface through which user communicate with system. It provides login to the system. After login to the system user is will get Google map with exact location of vehicles.

3. Tracking Device:

The tracking device will continuously request to the GPS satellite for its location information. At the same time GPS satellite will provide the location information to tracking device installed in vehicle. The tracking device will send the location information back to the server through GPRS and continuously update the database.

4. Monitoring Device:

Monitoring device will continuously access the database from server. From that database the location information will be plotted on Google maps.

Hardware requirements:

- PROCESSOR   : Intel i3 2.4 GHz
- Hard Disk   :   250 GB.
- Monitor   :   15' LCD MONITOR.
- MEMORY   :   2 GB.

- N/W ADAPTER :   802.11AC 2.4/5 GHz.
- OTHER'S   : KEYBOARD, MOUSE

Software requirements:

- OS   : W 7, 8, 10(x64)
- LANGUAGE   : JAVA BASED ANDROID
- FRONT-END   : XML DESIGN
- DATA BASE   : MSSQL SERVER 2008

VII. Conclusion

Those old day are gone where they use to call the ambulance and ask them to come to the user's location to take the patient to the hospital. As everything is available at a user's finger tips implementing it would help save a lot of patience life as the ambulance can be tracked at any location from the user's location. In the future this application can be upgrades to the next level by making it more interactive in such a way that during the time Accident user will send request to Ambulance which can be stored on the cloud, then once the ambulance reach patient using GPS, then the ambulance reaches the hospital in short time period and treat the patients and Save life.

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VEHICLES PEED MONITORING SYSTEMUSING ANDROID APPLICATION

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Abstract - An efficient vehicle tracking system isdesignedandimplementedfortrackingthemovementofanyequippedvehiclefromanylocation at any time. The proposed system madegooduseofapopulartechnologythatcombines aSmartphoneapplicationwithamobileApplication.Thiswillbeeasytomakeandinexpensivecomparedtoothers.Thedesignedin-vehicledeviceworksusingGlobalPositioningSystem(GPS)andGlobalsystemformobilecommunication / General Packet Radio Service(GSM/GPRS) technology that is one of the mostcommon ways for vehicle tracking. It enables thethirdpartyorownertogetthelocation,speedand activity of the driver. To achieve this, the systemcantransmittheinformationinrealtime.The useof GSM/GPRS technologies allows the system totracktheobjectsandprovidetheup-to-dateinformation. This information is authorized tospecific users over the internet as the server getstheinformation.Itisthetelemonitoringsystemtotransmitdatatotheremoteuser.Thispaperproposes a prototype model for location trackingusingGeographicalPositioningSystem(GPS)and Global System for Mobile Communication(GSM) technology. The development of mobileapplicationprovidesflexibilityandportabilityfortheusertogettheinformationfromanywhere. Asthese GPS technologies having greater range offrequencies, the user can get the information asquickeraspossible.Maybeinfuture,theapplicationwillbeapartofvehiclewiththeoptionenable and disable.

INTRODUCTION

TheVehicleTrackingSystemisusedtotrackthevehiclepositionandlocation.Itiscost-effective,reliableandhasthefunctionofaccuratespeedtrackingand controlling. It is completely Mobile Application,thenitiseasytotrackvehiclesatanytime.The accidentscanbeavoided ifwecontrolthespeedofthevehicle.TheuseofGSMandGPStechnologiesallowsthe system to track objectand provides up-to-dateinformation about ongoing trips. It could be used as avaluable tool for real time traveler. The current systemcanbeabletoprovidemonitoringprocessfromany where.

PROBLEMSTATEMENT

Survival in today's urban world cannot be imaginedwith proper means of transportation. Transportation isnot only crucial but has also become a necessity inone's life. One such means of transportation is the useof vehicles such as buses, cars etc. Owning a vehicletodayisnotmerelyasymbolofluxurybuthasbecomeanecessity.However,consideringvehicles,anycatastrophic situation can take place. Therefore, thereisalwaysanurgentneedtoarrangeappropriatemeasures to increase the safety, security as well asmonitor the vehicles to avoid any mishap. One suchmeasureistheuseofvehicletrackingsystemusingthe GPS(GlobalPositionSystem).Suchatrackingsystemincludes a mechanized device that is equipped in avehicle. Using software present at an operational base,it helps track the location of the vehicle. This basestationisusedformonitoringpurpose.Itisaccompaniedby mapssuchas Googlemaps,here

maps, Bing maps etc. for the representation of thelocation. The system is linked to Global PositioningSatellites which helps to acquire the time as well asthe position. The electronic device placed on thevehiclesconsistsofGPSreceiversandaGSMmodem. Developed by the American Military, GPSis a global system which uses satellites to show thelocations as well as the timings, anywhere over theearth. It usually requires at least 4 satellites to be onthevisiblehorizon.ItiseasilyaccessiblewithaGPSreceiver. GSM which was developed by the ETSIwith the aim to back the mobile communication, hasnowbecomeworldwideacceptedstandard.Dispatching and gathering of the data in a GSMsupportedmodemareperfectedusingtheradio signals.

EXISTINGSYSTEM

Detection of vehicle and tracking of speed if thecrucial part of town planning. In the last decade,vision-based traffic monitoring system has receivedconsiderable attention. This can be done with thehelp of vehicle detection and speed monitoring. Themonitoring system gives various information about,vehicle count, traffic congestion and speed of thevehicle. One of the root causes of road accidents isspeed.Extractingframesfromthevideoandcomparing the speed between two given points canbeusedtodeterminewhetherthecarismovingabove the permissible limit or not. Because of theseerrors, the United States of America's law keeps abufferof8kmwhichiscausedbecauseoftheabovementioned error. Also, radar technology cantrackonevehicleatatime.

PROPOSEDSYSTEM

In Proposed system we are using the sensors, GPSandGSMmodules.AndWealsomakeAndroidapplicationand,inthatuser,canregistertheapplication. And registration successful then Loginthe application. so, software module is following:GPSmoduleItisaglobalnavigationsatellitesystemthat gives geolocation and time information to GPS.A GPS receiver anywhere on the Earth where

thereisanopenlineofsighttofourormoreGPSsatellites.GPS systems are extremely adaptable and can befound in almost any sector. GPS systems are used inmilitaryapplicationsandbyemergencybandtolocatepeopleinneedofassistance.Ithasthreeparts:satellites,groundstations,andreceivers.Andreceiver calculates the distance from four or moresatellites,it knowsexactly whereyouare.

TECHNOLOGIES

I.   GPS

GPSisgroupofsatelliteswhichreceivessignalsfromthe GPS transmitter and sends data to the receiver.This enables you to know the exact location, speed,eventslikeopen/closeofdoor,fuellevelofthevehiclewhere it has GPS tracking unit. The component GPStracking device [transmitter] which is fitted inside thevehicle where it can't be easily detected by vehiclethiefandhencecan'tbedeactivatedeasily. Thetransmittersendssignalscontinuouslytothemonitoring station. The GPS server which takes careofthedata/signalreception,storeitsecurelyandprovide the data when asked. Finally, GPS interfaceor the control system which triggers sends the speedlimit data to the speedometer when the user sends thedatafrom themobile. Two typesofGPS are:

- PASSIVEGPS

It has the receiver that simply ―listen to the satellitesignalsandrecord[save]thosesignalsasdigitalform.When you want to see where the vehicle has beendriven,youconnectGPStrackertoyourPC.Theycanbe carried from one vehicle to another, as they arebatterypoweredandnowiresconnectedtothevehicle. Reporter captures a GPS signal once everysecond(i.e.)60times eachminute.

- ACTIVEGPS

Italsohasthereceiversthatworksassameaspassive GPS. The active units include aninternalcellular device that actually makes a phone call everyfewminutes.ThephonecalltransferssatellitereadingsandinformationaresavedinsideGPStra

cker to an internet site where you can login andtrackthevehicletoreducethespeed inrealtime.

II.   GSM

A GSM digitizes and compresses data, then sends itdown through a channel with two other streamsofuserdata, each in its own time slot. It operates ateither the 900 MHz or 1,800 MHz frequency   band. Itoperatesateitherthe900MHzor1,800MHzfrequencyband.Wecanmonitorandcheckthespeedsthuspreventingaccidents.Thus,ifwehaveGSMenabled devices in the cars the devices automaticallycommunicate with each other when they come in therange of up to 900 MHz band only 100 meters of eachother. The range is dependent on the power class ofthe product. Power transmission rates vary in manyBluetooth devices depending upon the powersavingfeaturesavailableinaparticularunit, bandwidth

requirements, transmission distance. The statisticsof road accidents is tremendous and there is a needforsuch asystem.

III.   GNSS

ThetermGlobalNavigationSatelliteSystem(GNSS) is a set constellation of satellites providingsignalsfromspacetransmittingpositioningandtiming data. By definition, a GNSS provides globalcoverage.GNSSreceiversdeterminelocation byusingthetimingandpositioningdataencodedinthesignals from space. The performance of a satellitenavigationsystemisassessedaccordingtofourcriteria: Accuracy refers to the difference betweenthe measured and the real position, speed or   time ofthereceiver.Integrityreferstoasystem'scapacitytoprovide confidence thresholds as well as alarms inthe event that anomalies occur in the positioningdata.Continuityreferstoanavigationsystem'sability to function without interruption. Availabilityrefers to the percentage of time during which thesignal fulfils the accuracy, integrity and continuitycriteria.

RECEIVINGGPSSIGNALS

The GPS satellite transmission pattern sends at leastfoursignalstoalllocationsonearthatalltimes.B

utthesignalscan'tpassthroughthesolidobjects.When turn on GPS it needs to receive signals fromat least 3satellitesto calculate your location. MostGPS gives a warning if they don't receive strongenoughsignals.

PINPOINTINGYOURLOCATION

GPS illustrates your location in location longitude,latitude,altitude.Theindicatedco-ordinatestoamap to pinpoint your location. The more accuratelyyou can identify your location. GPS   may   Include aclockthatusesthesatellitesignalstospecifytimeinyourlocation.GPSdevicescandisplaycurrentspeedbasedonhowmuchdistanceyouarecoveringina given time period. UsingGPS, adeviceis able.

TOOLSANDTECHNIQUES

AndroidStudio: AndroidStudioprovidesaunifiedenvironmentwherewecanbuildappsforAndroidphones.Structured code modules allow you to divide yourprojectintounitsoffunctionalitythatyoucanindependentlybuild,test,anddebug.Itisveryeasy   to develop an Android Application. In our proposedsystem,weuseAndroidstudioasdevelopmenttoolforimplementingproject.ItiseasytocreateUserInterfaceand connecting with real time database is done withplugins and Application Programming   Interface   (API)areeasy forintegration in Android Studio.

Figma: Figma is a design tool that lets you create designs formobile and web interfaces, or any other kind of designyou can think of. Figma is a collaboration tool forteams and individuals to create and share high-qualitywork. The main User Interface design and work flowof our proposed system are done by Figma platform.Becauseitverylight,simple andelegantfor teamwork,alsoverysimpletolearninshortperiodof time.

Java: There are many programming languages for buildingan application in Android studio. But in our proposedsystem we go with java for the

backend development.Because of its multi-platform support and security foruser data. Java Database connectivity helps to connectwith database over internet in easy manner for storing,accessingand working with data.

Firebase:

Firebase is a set of hosting services for any type ofapplication for Backend connectivity with Database. Itoffersreal-timehostingofdatabases,contentandnotifications, orservices,suchasareal-timecommunicationserver.Updatingofdetailsofe achdatawillbeaccessedbytheuserforinrealtimewit houtanyfurtherupdating ofandroid application

CONCLUSION

We have proposed a new way of looking at analysisof GPS speed control system. The GPS

and GSMmodule which is now two separate modules can beupgraded to a module which have both the GPS andGSMfunctionalities.Inaddition,GPSandGSMm odule with A-GPS and 3G or even 4G capabilitieswouldgreatlyincreaseboththeperforman ceandaccuracy of the tracking device in which the currenttracking device prototype does not support A-GPSandisonly2Gcapable.ModelingofGPSspeedco ntrol system should be done in a language which iseasy and more intuitive to work. This demonstrationwillprovidemoreefficiencyandreliabi lity.Infuture,we will develop the system that will be useful for thetraffic control at specific locations. The applicationscan be developer with all possible techniques to beusefultothe human society.

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Virtual Eye - Life Guard for Swimming Pools to Detect Active Drowning

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Abstract **- Safety is paramount in all swimming pools. The current systems expected to address the problem of ensuring safety at swimming pools have significant problems due to their technical aspects such as underwater camera and methodological aspects such as the need or human intervention in the rescue mission. The automated visual-based monitoring system can help to reduce drownings and assure pool safety effectively. In order to quickly help life savers judge whether people are drowning in the swimming pool.The VirtualEye software works in close integration with the cameras installed in the pool to continuously to scan the swimming pool. The First, by analyzing the spatial distribution of swimming pool when swimmers are normally swimming, the data labeling and swimmer detect methods are determined. Second, a behavior recognition framework of swimmers on the basis of YOLOv4 algorithm (BR-YOLOv4) is proposed.The spatial relationship between the location information of the target and swimming/drowning area of swimming pool is analyzed to determine the swimmer's drowning or swimming behavior. It introduces a revolutionary technology that identifies drowning victims in a minimum amount of time and dispatches an automated drone to save them. Using convolutional neural network (CNN) models, it can detect a drowning person in three stages. Whenever such a situation like this is detected, the inflatable tube-mounted self-driven drone will go on a rescue mission, sounding an alarm to inform the nearby lifeguards. The system also keeps an eye out for potentially dangerous actions that could result in drowning. This system's ability to save a drowning victim in under a minute has been demonstrated in prototype experiments' performance evaluations.The live video stream from our underwater cameras is automatically monitored by our "state-of-the-art" object recognition software. When it detects a swimmer in distress on the bottom of the pool, it will raise a radio alarm to pool lifeguards and an visual alarm to our Monitoring & Control Station. Lifeguards can visually assess the developing situation within seconds of the event first occurring, and initiate their rescue procedure when necessary.**

I. INTRODUCTION

Video surveillance can be used as a tool for monitoring and security. The visual monitoring capabilities can be employed in many different locations to help people live more safely. Video based surveillance systems are designed and installed in places such as railway stations, airports, and even dangerous environments. Image processing, pattern recognition and machine-vision based methods are efficient ways for real-time intelligent monitoring of the objects or events. The existing surveillance systems deliver valued information in monitoring of large areas. Applying intelligence in video surveillance systems allows realtime monitoring of places, people and their activities. The tracking approach can change with varying targets and can change from a single camera to multiple camera configurations. Tracking methods in video surveillance use different parameters such as objects motion, position, path of movement and velocity, biometrics such as skin color or clothes color and many more. The tracking must be robust and overcome occlusion and noise which are common problems in monitoring. One important environment that the need for monitoring systems is crucially sensed is the swimming pool. Each year many people including children are drowned or very close to drowning in the deeps of the swimming pools, and the life guards are not trained well enough to handle these problems. This raises the need for having a system that will automatically detect the drowning person and alarm the lifeguards of such danger. Real-time detection of a drowning person in swimming pools is a challenging task that requires an accurate system. The challenge is due to the presence of water ripples, shadows and splashes and therefore detection needs to have high accuracy. In swimming pool monitoring intelligent systems, different

approaches have been proposed. Most methods perform background processing on input video frames. Some apply background subtraction and image denoising to detect the drowning person. In a Gaussian Mixture Model is used for describing the pixels and the parameters of the model are updated with the EM algorithm. Also, neural networks can be trained to classify near-drowning and normal swimming patterns. However this requires to have a large dataset of both groups of behavior. The dataset is obtained in by attaching a pressure sensor to a swimmer imitating drowning behavior and normal swimming. Pattern recognition algorithms are also very useful in swimmer detection. In a background model that has prior knowledge about swimming pools is employed. This hierarchical model operates on behavioral traits common in almost all troubled swimmers. It uses movement and intensity information from image frames. In the YCbCr color model is selected for detection of the water polo players in water where luminance is separated and the Cb and Cr components are analyzed. Moreover, underwater ultrasonic sensors can detect drowning people up to 70 meters below water in the swimming pool along with a underwater video detection unit that locates and finds the victims. This research presents a vision-based approach for detecting a drowning person and alarming the life guards of such situations. The person swimming in the pool is detected and tracked using the HSV color space properties and contour-based methods. As soon as the moving target remains under water for more than a determined period of time, an alarm is sent to the lifeguard rescues. The HSV color space is selected over other color spaces because it is more effective in segmenting the swimmer in various light conditions from the background. The drowning detection component detects drowning victims through a custom CNN model, which detects drowning in three stages and immediately informs the user through an audio alert. The second component is the rescue drone, activated according to the drowning detection command and sent to the victim's location coordinates. This procedure uses a custom-configured x and y coordinate block system to link to ground GPS coordinates. At the same time, potentially dangerous activities, including running around the swimming pool and drinking, will be notified to authorized personnel in the premises through mobile alarms by the hazard detection component.
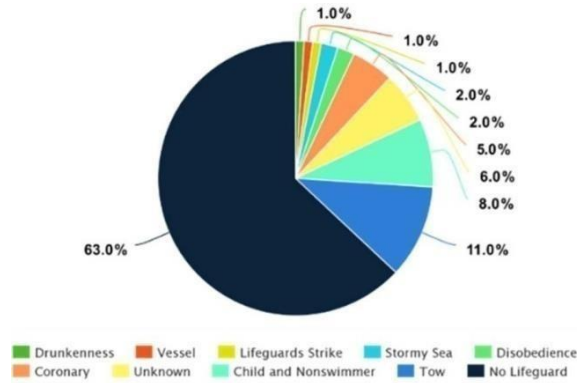
Apart from drowning, those who disobey pool laws and regulations cause discomfort to others while causing serious health problems for themselves with dangerous actions such as drinking and running around the pool [4], [5]. Fig.1 shows how lifeguards claim that lack of care is the most probable cause of drowning, among the other reasons that intoxication appears to be present [6], [7].

Considering the possibility that attempts to save lives in the water using traditional methods fail, it is clear thatan intelligent system is needed. The system described in this paper uses computer vision to detect and rescue drowning victims to ensure the safety of pools. The system uses computer vision along with automated electronic equipment to immediately rescue and protect the lives of swimmers in the pool. By integrating the camera above the water surface, it can recognize struggling motions before a fatality occurs.

The camera's location captures a complete view of the facility, including swimmers, wanderers, and occupied objects. Swimmers are individually identified using object detection, noise cancellation and individually tracked using deep learning technologies to identify a possible drowning. On detection, the location coordinates of the drowning person are immediately calculated based on the ground coordinates (a grid system linked to x and y blocks) and sent to an autonomous custom drone while sounding an alarm, informing that more security measures should be taken. In addition, the detection of hazardous activities through computer vision concepts and posture detection in the facility's swimming pool ensures the safety and well-being of swimmers. This goal is achieved by using Firebase Cloud Messaging (FCM), the primary notification source to authorized personnel if a dangerous activity is detected. The structure of the article is as follows. Firstly, the literature survey discusses the currently available existing systems and technologies that have similar targets using both software and hardware-based technologies. Secondly, the methodology section explains the steps of how the system tried to solve this problem. Next, the results and discussion section analyze the main experimental results. The final section discusses the advantages and disadvantages of and possible work to improve the system in the future.

1.LITERATURE SURVEY

Video-based systems and wearable sensor-based systems are two types of existing drowning detection technologies. It will use of Object detection using different techniques will usage of Convolutional Neural Network (CNN) architecture in Deep Neural Networks (DNNs) has added a significant shift in learning more complicated, informative characteristics in images as compared to older

Fig. 1. Relative percentage of drowning causes according tolifeguards'reports

using Computer Vision has Current work on human motion prediction has been focused on two independent but complementary sub-tasks, according to Anand Gopalkrishnan, Short-term motion prediction, which is quantitatively evaluated by measuring the mean squared error (MSE) over a short period, and long-term motion prediction, qualitatively evaluated by visual inspections of samples over a long period. Short-term models would be valuable in motion tracking applications because these jobs are applicable in several domains of work. On the other hand, long-term models might be valuable for creating computer graphic tools due to their broad applicability. Additionally, both models could be useful in human gait analysis, kinematics research, and human- computer interaction.

A. Object Detection Using Different Techniques

It is claimed that the usage of Convolutional Neural Network (CNN) architecture in Deep Neural Networks (DNNs) has added a significant shift in learning more complicated, informative characteristics in images as compared to the older techniques [16]. Furthermore, further optimized models such as Fast R-CNN, Faster R-CNN, and YOLO have been constructed since the region-based convolutional neural network (R-CNN) architecture proposal. Fast R-CNN, which improves bounding box (BB) regression and classification [17]; Faster R-CNN [18], which generates area suggestions using an extra sub-network [18]; and YOLO, which detects objects using a fixed-grid regression [19], are all faster than R- CNN. Bounding box regression is used to recognize generic objects based on basic CNN architectures. Local contrast enhancement and pixel- level segmentation, on the other hand, are used to recognize salient objects [20]. The techniques used in detecting objects under this chapter will be crucial as they establish the groundwork for the methodologies used to identify drowningand hazardous activities.

B. Drowning Detection And Tracking

To avoid drowning events utilizing an alert system, Alshbatat et al. [10] proposed an integrated vision-based monitoring system consisting of a Raspberry Pi, two Pixy cameras, and an Arduino Nano board. They employed two cameras to detect and monitor swimmers by measuring their positions, and the swimmers were obliged to wear passive yellow vests. NEPTUNE [21], is another unique technologythat uses statistical image processing [22] of video sequences to detect drowning victims as soon as possible. The equations utilized in detecting near-drowning victims are based on the variables created by statistical image processing. Another system called VIBE [15] uses background extraction to detect and track drowning victims and updates the motion area by taking the frame difference using the VIBE algorithm, which primarily evaluates the swimmers' positions when making judgments. How-Lung et al. [23] examine some difficulties in spotting drowning victims in a watery environment and offer an automatic detection surveillance system. The key obstacles in

the aquatic environment, according to the authors, are water ripples and splashes, as well as background movements of the reflective zones. When it comes to recognizing swimmers, occlusions are also mentioned as a challenging difficulty. Their proposed solution is an algorithm that takes into account all of these issues and detects water crises in complex aquatic environments [24], [25].

C. Activity Detection Using Computer Vision

Current work on human motion prediction has been focused on two independent but complementary sub-tasks, according to Anand Gopalkrishnan [26]. 1) Short-term motion prediction, which is quantitatively evaluated by measuring the mean squared error (MSE) over a short period,and 2) long-term motion prediction, qualitatively evaluated by visual inspections of samples over a long period. Short- term models would be valuable in motion tracking applications because these jobs are applicable in several domains of work. On the other hand, long-term models might be valuable for creating computer graphic tools due to their broad applicability. Additionally, both models could be useful in human gait analysis, kinematics research, and human-computer interaction.

METHODOLOGY

The system explained in this paper includes three main functions: detecting drowning victims, sending drones to victims, and detecting dangerous activities. The drowning detection component detects drowning victims through a custom CNN model, which detects drowning in three stages and immediately informs the user through an audio alert. The second component is the rescue drone, activated according to the drowning detection command and sent to the victim's location coordinates. This procedure uses a custom- configured x and y coordinate block system to link to ground GPS coordinates. At the same time, potentially dangerous activities, including running around the swimming pool and drinking, will be notified to authorized personnel in the premises through mobile alarms by the

hazard detection component. This will prompt authorized personnel (including lifeguards) to make responsible decisions.
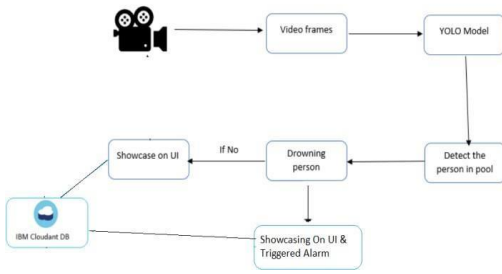

Fig.2. technical architecture

A. Drowning Detection And Tracking

1. Creation of the data set: Due to the lack of an existing aquatic human body parts data set, a data set containing 5000 images were constructed. All images in the dataset contain at least one or more swimmers in the water

- Image Collection: The primary source of data collection is the induction of actors and the collection of videos in real-time. The secondary source of data collection is the Internet, using specific keywords, such as "swimmer", "swimming", "drowning", "drowning in a swimming pool",

- Image Labelling: LabelImg – a graphical tool implemented in Python, is used to mark the image. Each image is labelled by creating arbitrary bounding boxes and predefined labels in YOLO format. The predefined tags used in image annotation are"Not_drowning","Drowning_stage_1","Drowning_stage_2",and "Drowning_stage_3".

2. Model Creation: Use Google Colab to create and train models and get weight files every 100 iterations. The created model is then implemented on the NVIDIA Jetson Nano board, which runs on the Quad-core ARM CortexA57 processor. The main reason for using NVIDIA Jetson is to run multiple neural models parallel without complications and with a limited budget.

First, swimmers in the pool are detected using an overhead camera and are kept track using the DeepSORT algorithm. YOLO is used to detect objects by locating one or more objects in the image and sorting each object. Yolo works well with a good resolution of entry compared to other models [20]. Most of the problems in the detection and monitoring of swimming players are occlusal, scale changes, changes of appearance. These problems can be overcome using YOLO [27]. The location of the tracked swimmer is also obtained using a predefined coordinate system.

Fig.3 shows the custom predefined coordinate system for the swimming pool. Initially, the detection of swimmers is tracked while using a predefined coordinate system to obtain their position coordinates. At the same time, it will also check whether the swimmer has entered any drowning stage. If such an event is identified, the camera will track video clips in real-time to detect drowning victims. Using CNN, the human detection algorithm will use the image frames to identify the drowning person. Once the location block of the drowning victim is correctly identified, an audible alarm will sound to notify authorized personnel of the event.

The images in the data set must include at least one drowning person to identify the chart as a drowning situation. A person's posture and movement can quickly identify a drowning victim. Although it is easy to recognize, one of the most common exercises is the "vertical ladder" exercise, which imitates the movement of a person climbing a ladder in a vertical movement [28].

TABLE I. MAIN CLASSES USED IN IDENTIFYING A DROWNING VICTIM

Class	Features
Drowning_stage_1	Head is above the water
Drowning_stage_2	Half of the head is underwater, and hand gestures are in the climbing ladder motion
Drowning_stage_3	Head is underwater, and hand gestures are in the climbing ladder motion
Not_drowning	Regular swimming and floating motions

Table I describes the four categories used to classify swimmers: Drowning_stage_1, Drowning_stage_2, Drowning_stage_3, and Not drowning. In the event of drowning, a frame pattern of stage 1 to stage 2 and then to stage 3 can be seen. Fig.4 consists of three images, each 743 pixels and 243 pixels in size. According to the climbing ladder motion, people who switched between stages 2 and 3 were identified as drowning victims. Finally, the location block of the drowning victim is passed to the drone.

Fig.3. Three primary drowning stages

A. Identification Of Hazardous Activities

In addition, the system can also analyze all visible activities in the pool to ensure the swimmer's safety. Continuous monitoring ensures that dangerous activities are not carried out on the premises. This is accomplished by notifying authorized personnel via mobile alarms when a dangerous activity occurs.

The process of identifying hazardous activities at a location is initiated by collecting hazardous and non- hazardous activity data sets. The data set is collected in a pool that contains people hanging out in an environment. The identification process after the alarm notification can be divided into four steps.

1. Masking and noise extraction: Due to the camera arrangement, the noise obtained from the water surface at the site is concentrated in the water waves during the day. As shown in Fig.5, which is of size 1280 x 720 pixels, a fundamental step of masking the image is performed to remove the image's noisy areas. Due to the non-stationary nature of the camera, all frames have static X and y coordinates as masking points.

Fig.4. Masked image for hazardous activity prediction

2. Skeleton sketching: Skeleton sketching is done using Open Pose - a real-time multi-person key point detection library [29], [30] for pose estimation, which is then used to draw skeleton-based human figures to recognize a person's pose in real-time [31]. The poses recognized by pose estimation uses a combination of DNN models to successfully approximate a complex nonlinear mapping function from a random image of a person to match the position, as shown in Fig.6. Each of the images is of size 1280 x 720 pixels due to the static nature of the camera placement.

Fig.5. Steps in retrieving the CNN input

3. Labelling images using CNN: Using transfer learning, a

YOLOv3 model [19] was improved to create a custom model. The sketched dark backgrounded images identified through the skeleton sketching process are integrated into the customized CNN model, identifying the categories (hazardous and non-hazardous activities). The training is carried out in two batches at the Learning Rate of 0.001, and the data set maintains a set of 1000 images for each class labelled for training.

4. Notifying the authorized personnel using mobile alerts: A status alert is sent to one of the authorized personnel devices if a frame is classified as hazardous. This, in turn, will notify the regarded personnel to initiate necessary precautions and measures. The notification signal would be in the form of a Firebase push notification, as it is swift and easily comprehensive. The Android service [32] is compatible with any Android mobile running version from 4.4 (KitKat) and above.

I. RESULTS AND DISCUSSION

a. Drowning Detection and Tracking Results

The YOLO detection algorithm [19] uses 416 X 416 as its input dimensions. The drowning victims are detected in three stages using a YOLO-based detection technique. Even though the swimmer stayed underwater for an extended period, the Deep SORT algorithm [33] could keep track of them. The mentioned Fig.7 depicts the model's performance (False Positives and True Positives only) with 500 images.

Fig.6. Detection results for drowning

Table II shows the test accuracies of the model as a
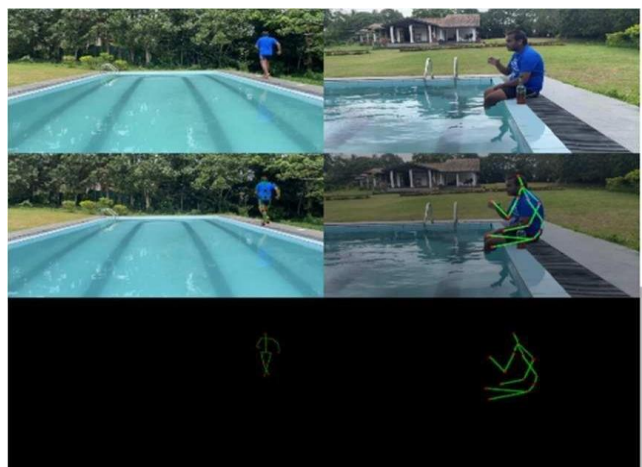
percentage of classified photos, which was produced using a model with

500 testing images. Equation (1) is used to calculate the model's accuracy.

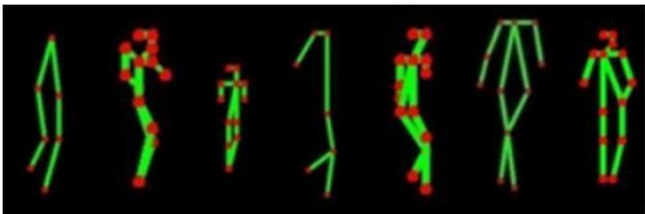$$Accuracy = (TP + TN) / (TP + TN + FP + FN) \qquad (1)$$

TP - True Positives, FP - False

Positives, TN - True Negatives,FN -

False Negatives

TABLE II. ACCURACIES OF THE TESTING DATASET

Accuracy Variables	Count
TP	220
TN	208
FP	42
FN	30
Total Accuracy	85.6%

A. Hazardous Activities

Because of the noise elimination via picture masking, the posture estimate accuracy was greatly improved. To allow the pose estimation algorithm to make more radical judgments, the default threshold value for the Open Pose body parts heat map was changed from 0.2 to 0.1. Although frame-by-frame identifications were only identified with a probability of 53% due to the threshold adjustment, the total system, which

inflatable tube using a drone (as depicted in Fig.9) and detecting hazardous activities—eventually becoming an entity that could assist a lifeguard. The system is accessible to its primary user, presumably a pool owner or a lifeguard, in the form of an interface with a sound alarm and an android mobile service that holds the capabilities of receiving Firebase notifications.

Confined with a few of the hardware limitations, such as the use of a single camera and the Jetson Nano at the presence of better-quality hardware, could affect the speed and accuracy of the overall system is becoming a state-of-the- art. This limitation could be omitted with the use of multiple cameras that could be placed over the premises in several ground coordinates, increasing the accuracy of the computer vision algorithms. Moreover, due to the inability to fly a drone in extreme weather conditions such as rain, strong winds or lightning, the system is limited to be used under few specifications. As swimming in extreme weather conditions is not preferred either, the system could be further improved to emit a warning signal if a person was to swim in any of the above weather conditions, bypassing the need to fly the drone.

examined a frame in real-time, was able to identify a hazardous activity with much greater ease within 60 seconds, with a mean accuracy of 91.4 percent, after the threshold was changed. Fig.8 illustrates a few of the postures recognized of various positions.

Fig.7. Posture identification for running after the threshold change

A close examination of the misclassified postures among the testing sets revealed that a posture was more prone to misclassification as it approached the far end of the camera, indicating the need for a secondary camera to improve accuracy and confirm the true positives from the primary camera, as shown in Table II. Although employing a higher- quality camera to fix this problem is a good idea, the requisite hardware and the near-real-time CNN techniques used to detect further objects may not be up to standard at present.

CONCLUSION AND FUTURE WORK

This computer vision-enabled automated drone- based lifeguard system consists of three main components, i.e., the drowning detection, the rescuing drone, and the hazardous activity detection. All three components combined will create a system capable of detecting drowning victims, dispatching an Additionally, all the processing is done on the client- side of the applications on the Jetson Nano board, preventing any security and privacy issues that might arise due to the sensitive information inputted through the

cameras.

For future developments convenience wise, the system could benefit by having an additional set of cameras to identify and verify a drowning or a hazardous activity on the premises. Accessibility could also be improved by extending the Android service to be an application both in Android and iOS platforms that could hold the details of each premise individually, making a centralized system that watches over the decentralized pool premises. Both drown and hazardous activity detection could be improved by gathering a nighttime dataset that increases the accuracy of the data in low light.

Fig.9. Drone residing prior to take-off

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Virtual mouse

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Abstract

This paper proposes a way to control the position of the cursor with the bare hands without using the electronic device.While the operations like clicking and dragging of objects will be performed with different hand gestures.The proposed system will only require a webcam as an input device.The software's that will be required to implement the proposed system are openCV and python.The output of the camera will be displayed on the system's screen,so that it can be furthercalibrated by the user.

The mouse is one of the wonderful inventions of Human-Computer Interaction (HCI) technology. Currently, wireless mouse or a Bluetooth mouse still uses devices and is not free of devices completely since it uses a battery for power and a dongle to connect it to the PC. In the proposed AI virtual mouse system, this limitation can be overcome by employing webcam or a built-in camera for capturing of hand gestures and hand tip detection using computer vision. The algorithm used in the system makes use of the machine learning algorithm. Based on the hand gestures, the computer can be controlled virtually and can perform left click, right click, scrolling functions, and computer cursor function without the use of the physical mouse. The algorithm is based on deep learning for detecting the hands.

Introduction

With the development technologies in the areas of augmented reality and devices that we use in our daily life, these devices are becoming compact in the form of Bluetooth or wireless technologies. This paper proposes an AI virtual mouse system that makes use of the hand gestures and hand tip detection for performing mouse functions in the computer using computer vision. The main objective of the proposed system is to perform computer mouse cursor functions and scroll function using a web camera or a built-in camera in the computer instead of using a traditional mouse device. Hand gesture and hand tip detection by using computer vision is used as a HCI with the computer. With the use of the AI virtual mouse system, we can track the fingertip of the hand gesture by using a built-in camera or web camera and perform the mouse cursor operations and scrolling function and also move the cursor with it.

While using a wireless or a Bluetooth mouse, some devices such as the mouse, the dongle to connect to the PC, and also, a battery to power the mouse to operate are used, but in this paper, the user uses his/her built-in camera or a webcam and uses his/her hand gestures to control the computer mouse operations. In the proposed system, the web camera captures and then processes the frames that have been captured and then recognizes the various hand gestures and hand tip gestures and then performs the particular mouse function.

Python programming language is used for developing the AI virtual mouse system, and also, OpenCV which is the library for computer vision is used in the AI virtual mouse system. In the proposed AI virtual mouse system, the model makes use of the MediaPipe package for the tracking of the hands and for tracking of the tip of the hands, and also, Pynput, Autopy, and PyAutoGUI packages were used for moving around the window screen of the computer for performing functions such as left click, right click, and scrolling functions.

The results of the proposed model showed very high accuracy level, and the proposed model can work very well in real-world application with the use of a CPU without the use of a GPU.The system can be used to control robots and automation systems without the usage of devices..2D and 3D images can be drawn using the AI virtual system using the hand gestures.

AI virtual mouse can be used to play virtual reality- and augmented reality-based games without the wireless or wired mouse devices. Persons with problems in their hands can use this system to control the mouse functions in the computer. In the field of robotics, the proposed system like HCI can be used for controlling robots.In designing and architecture, the proposed system can be used for designing virtually for prototyping. The main advantage of using the hand gestures is to interact with computer as a non-contact human computer input modality. Reduce hardware cost by eliminating use of mouse. convenient for users not comfortable with touchpad. The framework may be useful for controlling different types of games and other applications dependent on the controlled

Aim and objective of research work include-

• For most laptop touchpad is not the most comfortable and convenient.

• Main objective pre-processing is to represent the data in such a way that it can be easilyinterpreted and processed by the system.

• Reduce cost of hardware.

• No hardware.

through user defined gestures.It has been generations since we have been using hand gestures for communicating in human society. The shaking of hands, Thumbs up and Thumbs down signs have been ever existing in the environment. It is believed that gestures are the easiest way of interaction with anyone. So then why not apply it to the machines that we are using. In this work, we are demonstrating, real- gesture. The initial setup includes a low-cost USB web camera that can be used for providing the input to the system. The complete process is divided into 4 steps which are frame-capturing, image-processing, region extraction, feature-matching. To the extreme, it can also be called as hardware because it uses a camera for tracking hands.

It focuses on extracting the features over the human hands and then matching their features to recognize the movement of the hand.

Project essential feature-

• User friendly.

• Portable.

• Handle simple operation left- click dragging,minimizing.

The existing system consists of a mouse that can be either wireless or wired to control the cursor, know we can use hand gestures to monitoring the system. The existing virtual mouse control system consists of the simple mouse operation using the colored tips for detection which are captured by web-cam, hence colored fingers act as an object which the web-cam sense color like red, green, blue color to monitor the system, whereas could perform basic mouse operation like minimize, drag, scroll up, scroll down, left-click right-click using hand gestures without any colored finger because skin color recognition system is more flexible than the existing system. In the existing system use static hand recognition like fingertip identification, hand shape,

Number of fingers to defined action explicitly, which makes a system more complex to understand and difficult to use. This work can easily replace the traditional mouse system that has been in existence for decades with the use of this algorithm the user can control the mouse without the fuss of any other hardware device this is done using a hand gestures recognition with inputs from a web-cam.

Software and Hardware Specicification:

Software components:
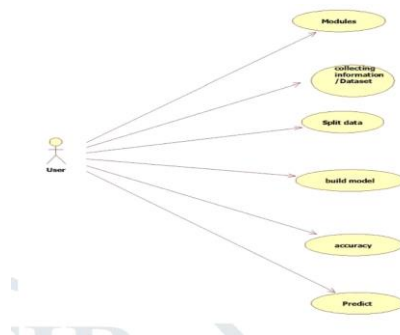- Python version 3.7.2
- VS code editor

Hardware Components:
- Minimum 2 GB Ram
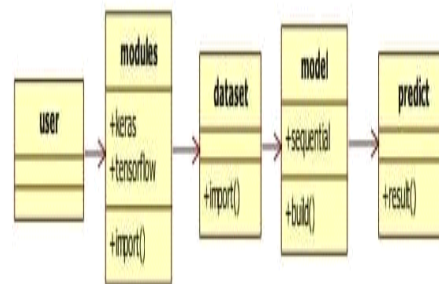- 64- Bit Architecture.
- Webcam or Default Camera.

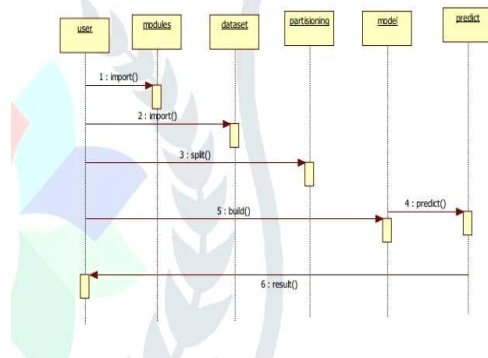## Software Analysis and Design

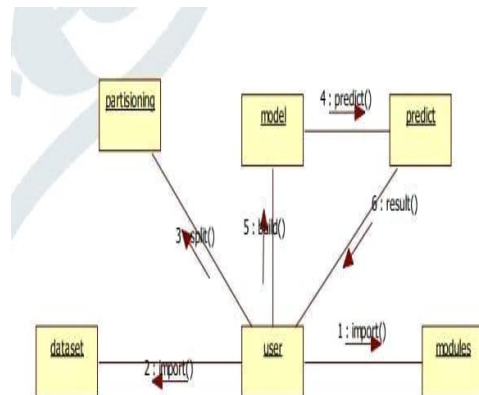- **Usecase diagram:**

FIG 4.1

CLASS DIAGRAM:

FIG 4.2

Sequence diagram:

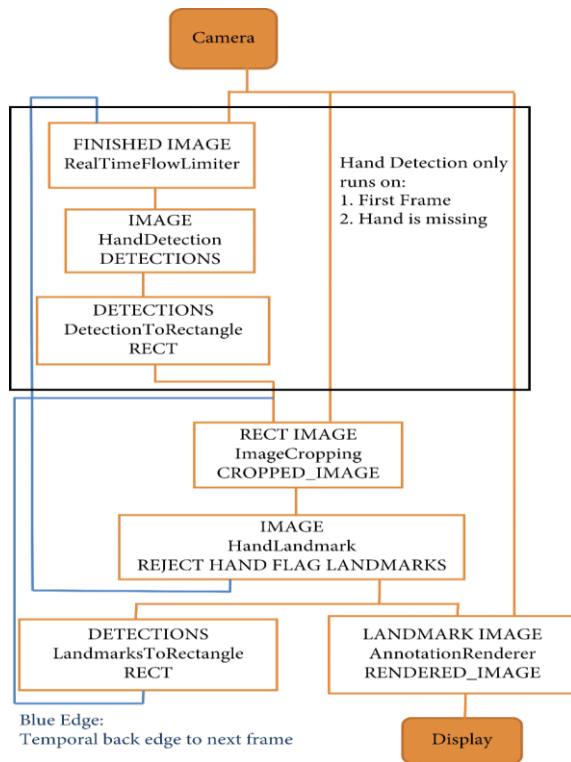**Figure4.3**

Figure 4.4

Software Development

Modules used in AI virtual mouse:

- Mediapipe.
- OpenCV-Python.
- Numpy.

Mediapipe

MediaPipe is a framework which is used for applying in a machine learning pipeline, and it is an opensource framework of Google. The MediaPipe framework is useful for cross platform development since the framework is built using the time series data. The MediaPipe framework is multimodal, where this framework can be applied to various audios and videos . The MediaPipe framework is used by the developer for building and analyzing the systems through graphs, and it also been used for developing the systems for the application purpose. The steps involved in the system that uses MediaPipe are carried out in the pipeline configuration. The pipeline created can run in various platforms allowing scalability in mobile and desktops. The MediaPipe framework is based on three fundamental parts; they are performance evaluation, framework for retrieving sensor data, and a collection of components which are called calculators , and they are reusable. A pipeline is a graph which consists of components called calculators, where each calculator is connected by streams in which the packets of data flow through. Developers are able to replace or define custom calculators anywhere in the graph creating their own

application. The calculators and streams combined create a data-flow diagram; the graph is created with MediaPipe where each node is a calculator and the nodes are connected by streams.

Single-shot detector model is used for detecting and recognizing a hand or palm in real time. Thesingle-shot detector model is used by the MediaPipe. First, in the hand detection module, it is first trained for a palm detection model because it is easier to train palms. Furthermore, the non- maximum suppression works significantly better on small objects such as palms or fists. A

FIGURE 4.5

model of hand landmark consists of locating 21 joint or knuckle co-ordinates in the hand region, as shown in Figure.

Figure 5.2

• **OpenCV-Python**

OpenCV (Open-Source Computer Vision Library) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by
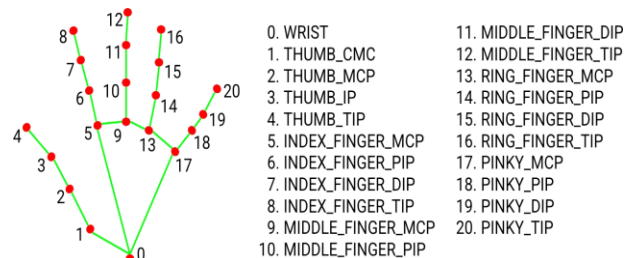
Intel, it was later supported by Willow Garage then Itseez (which was later acquired by Intel). The library is cross-platform andfree for use under the open-source Apache 2 License. Starting with 2011, OpenCV features GPUacceleration for real-time operations.

OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. All of the new developments and algorithms appear in the C++ interface. There are bindings in Python, Java and MATLAB/OCTAVE. The API for these interfaces can be found in the online documentation.

Wrappers in several programming languages have been developed to encourage adoption by a wider audience.

• **Numpy**

NumPy is a library for the Python programming language, adding support for large, multi- dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. The ancestor of NumPy, Numeric, was originally created by Jim Hugunin with contributions from several other developers. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors. NumPy is a NumFOCUS fiscally sponsored project.

NumPy targets the CPython reference implementation of Python, which is a

In version 3.4, JavaScript bindings for a selected subset of OpenCV functions was released as OpenCV.js, to be used for web platforms.

OpenCV runs on the following desktop operating systems: Windows, Linux, macOS, FreeBSD, NetBSD, OpenBSD. OpenCV runs on the following mobile operating systems: Android, iOS, Maemo, BlackBerry 10. The user can get official releases from SourceForge or take the latest sources from GitHub. OpenCV uses CMake.

non-optimizing bytecode interpreter. Mathematical algorithms written for this version of Python often run much slower than compiled equivalents due to the absence of compiler optimization. NumPy addresses the slowness problem partly by providing multidimensional arrays and functions and operators that operate efficiently on arrays; using these requires rewriting some code, mostly inner loops, using NumPy.

Using NumPy in Python gives functionality comparable to MATLAB since they are both interpreted, and they both allow the user to write fast programs as long as most operations work on arrays or matrices instead of scalars. In comparison, MATLAB boasts a large number of additional toolboxes, notably

Simulink, whereas NumPy is intrinsically integrated with Python, a more modern

and complete programming language.

• **PyAutoGUI**

PyAutoGUI lets your Python scripts control the mouse and keyboard to automate interactions with other applications. The API is designed to be simple. PyAutoGUI works on Windows, macOS, and Linux, and runs on Python 2

and 3. PyAutoGUI is a cross-platform GUI automation Python module for human beings. Used to programmatically control the mouse & keyboard. Pillow needs to be installed, and on Linux you may need to install additional libraries to make sure Pillow's PNG/JPEG works correctly.

Software Testing

• **Test Cases:**

A test case is a document, which has a set of test data, preconditions, expected results and postconditions, developed for a particular test scenario in order to verify compliance against a specific requirement.Test Case acts as the starting point for the test execution, and after applying a set of input values, the application has a definitive outcome and leaves the system at some end point or also known as execution postcondition.

Software testing is known as a process for validating and verifying the working of a software/application. It makes sure that the software is working without any errors, bugs, or any other issues and gives

the expected output to the user. The software testing process doesn't limit to finding faults in the present software but also finding measures to upgrade the software in various factors such as efficiency, usability, and accuracy. So, to test software the software testing provides a particular format called a Test Case.

A test case is a defined format for software testing required to check if a particular application/software is working or not. A test case consists of a certain set of conditions that need to be checked to test an application or software i.e. in more simple terms when conditions are checked it checks if the resultant output meets with the expected output or not. A test case consists of various parameters such as Id,

condition, steps, input, expected result, result, status, and remarks.

- ## Unit Testing:

Unit testing is a type of software testing where individual units or components of a software are tested. The purpose is to validate that each unit of the software code performs as expected. Unit Testing is done during the development (coding phase) of an application by the developers. Unit Tests isolate a section of code and verify its correctness. A unit may be an individual function, method, procedure, module, or object.

In SDLC, STLC, V Model, Unit testing is first level of testing done before integration testing. Unit testing is a Whitebox testing technique that is usually performed by the developer. Though, in a practical world due to time crunch or reluctance of developers to tests, QA engineers also do unittesting.

Unit Testing is a software testing technique by means of which individual units of software i.e. group of computer program modules, usage procedures, and operating procedures are tested to determine whether they are suitable for use or not. It is a testing method using which every independent module is tested to determine if there is an issue by the

developer himself. It is correlated with the functional correctness of the independent modules. Unit Testing is defined as a type of software testing where individual components of a software are tested. Unit Testing of the software product is carried out during the development of an application. An individual component may be either an individual function or a procedure. Unit Testing is typically performed by the developer. In SDLC or V Model, Unit testing is the first level of testing done before integration testing. Unit testing is such a type of testing technique that is usually performed by developers. Although due to the reluctance of developers to test, quality assurance engineers alsodo unit testing.

- ## Integration testing:

Integration testing is defined as a type of testing where software modules are integrated logically and tested as a group. A typical software project consists of multiple software modules, coded by different programmers. The purpose of this level of testing is to expose defects in the interaction between these software modules when they are integrated.Integration Testing focuses on checking data communication amongst these modules. Hence it is also termed as

'I & T' (Integration and Testing), 'String Testing' and sometimes 'Thread Testing'.

Integration testing is the process of testing the interface between two software units or modules. It focuses on determining the correctness of the interface. The purpose of integration testing is to expose faults in the interaction between integrated units. Once all the modules have been unit tested, integration testing is performed.

Big-Bang Integration testing is the simplest integration testing approach, where all the modules are combined and the functionality is verified after the completion of individual module testing. In simple words, all the modules of the system are simply put together and tested. This approach is practicable only for very small systems. If an error is found during the integration testing, it is very difficult to localize the error as the error may potentially belong to any of the modules being integrated. So, debugging errors reported during big bang integration testing is very expensive to fix.

In bottom-up testing, each module at lower levels is tested with higher modules until all modules are tested. The primary purpose of this integration testing is that each subsystem tests the interfaces among various modules making up the subsystem. This integration testing uses test drivers to drive and pass appropriate data to the lower-level modules.

• **System Testing:**

System Testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. Usually, the software is only one element of a larger computer-based system. Ultimately, the software is interfaced with other software/hardware systems. System Testing is actually a series of different tests whose sole purpose is to exercise the full computer-based system.

It is performed on a complete integrated system to evaluate the compliance of the system with the corresponding requirements. In system testing, integration testing passed components are taken as input. The goal of integration testing is to detect any irregularity between the units that are integrated together. System testing detects defects within both the integrated units and the whole system. The result of system testing is the observed behavior of a component or a system when it is tested. System Testing is carried out on the whole system in the context of either system requirement specifications or functional requirement specifications or in

the context of both. System testing tests the design and behavior of the system and also the expectations of the customer. It is performed to test the system beyond the bounds mentioned in the Software requirements specification (SRS). System Testing is basically performed by a testing team that is independent of the development team that helps to test the quality of the system impartial. It has both functional and non-functional testing. System Testing is a black-box Testing. System Testing is performed after the integration testing and before the acceptance testing.

• **Acceptance Testing:**

Acceptance Testing is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. Acceptance Testing is done in the final phase of testing after functional, integration and system testing are done. The main Purpose of Acceptance Testing is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing

where two or more end-users will be involved.

Acceptance Testing is a method of software testing where a system is tested for acceptability. The major aim of this test is to evaluate the compliance of the system with the business requirements and assess whether it is acceptable for delivery or not. Acceptance testing, a testing technique performed to determine whether or not the software system has met the requirement specifications. The main purpose of this test is to evaluate the system's compliance with the business requirements and verify if it is has met the required criteria for delivery to end users. The acceptance test cases are executed against the test data or using an acceptance test script and then the results are compared with the expected ones.

Output Screen Shot
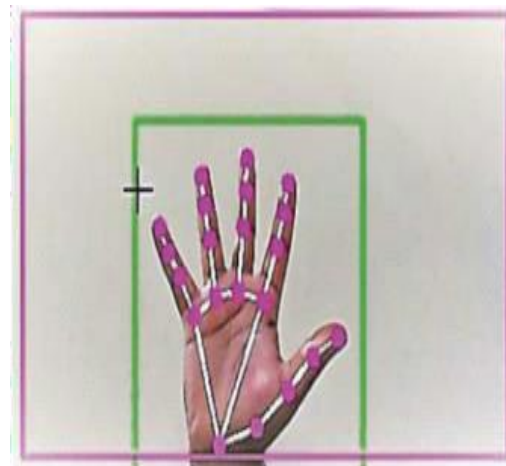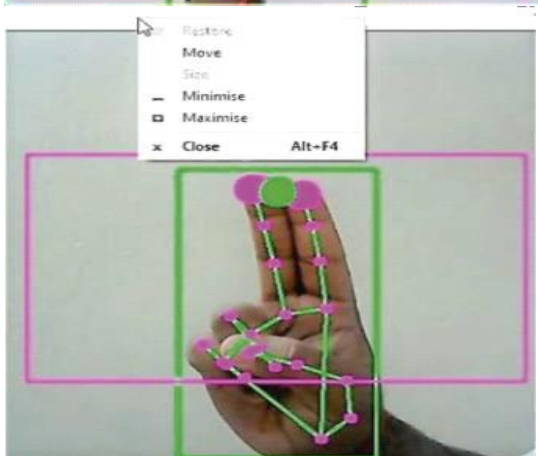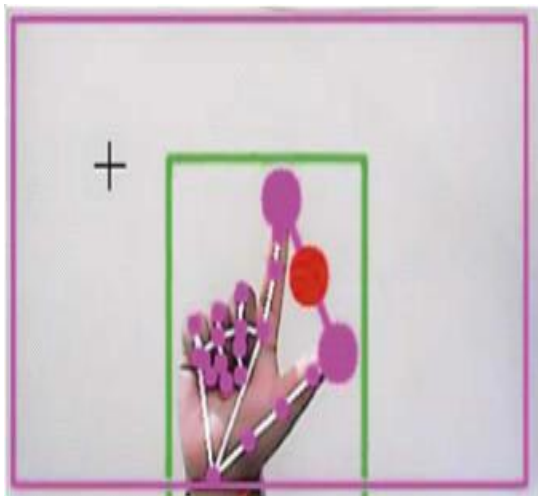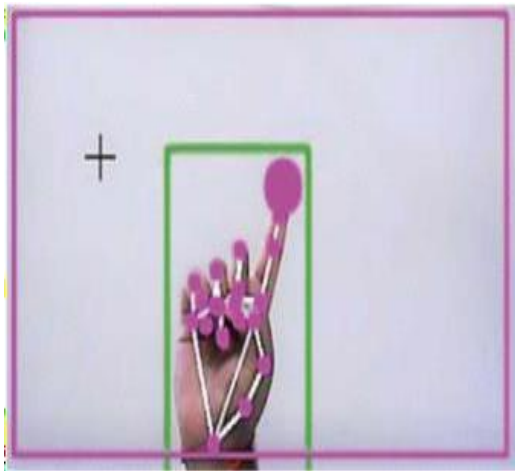
Conclusion

The main objective of the AI virtual mouse system is to control the mouse cursor functions by using the hand gestures instead of using a physical mouse. The proposed system can be achieved by using a webcam or a built-in camera which detects the hand gestures and hand tip and processes these frames to perform the particular mouse functions. From the results of the model, we can come to a conclusion that the proposed AI virtual mouse system has performed very well and has a greater accuracy compared to the existing models and also the model overcomes most of the limitations of the existing systems. The model has some limitations such as small decrease in accuracy in right click mouse function and some difficulties in clicking and dragging to select the text. Hence, we will work next to overcome these limitations by improving the finger tip detection algorithm to produce more accurate results.

WIRELESS SENSOR NETWORK FOR HEAVY BREATHING CONTROL DETECTION SYSTEM
(WITH BOND STRUCTURE – CIP)

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ABSTRACT

Wireless sensor network (WSN) technologies are considered one of the key research areas in computer science and the healthcare application industries for improving the quality of life. The purpose of this paper is to provide a snapshot of current developments and future direction of research on wireless sensor network for heavy breathing control detection system.This paper explains the Possible to read the stress level, by measuring the Respiratory and Heart rate range.To provide an solution for the snoring problem by using an smart device, without any side effects.The system will increase the sleeping time of the affected person and thereby improve the quality of sleep.As an overall, the system will help control the snoring through sleeping behaviors.

INTRODUCTION

Wireless sensor network (WSN) technologies have the potential to change our lifestyle with different applications in fields such as healthcare, entertainment, travel, retail, industry, dependent care and emergency management, in addition to many other areas. The combination of wireless sensors and sensor networks with computing and artificial intelligence research have built a cross-disciplinary concept of ambient intelligence in order to overcome the challenges we face in everyday life.One of the main challenge is facing by the people is Snoring,it occurs when something restricts your airflow during sleep. Loud or long-term snoring increases the risk of heart attack, stroke and other health problems. You may be able to stop snoring by losing weight and avoiding alcohol before

bed. If snoring keeps you awake or disrupts your partner's sleep, talk to your provider about treatments..Wireless sensor network for heavy breathing control detection system is one tool to achieve this objective, avoid the snoring of the person and recover him by continuous monitoring and support with WSN based assistive training.

OBJECTIVES

To detect snoring and prevent the person from continuous snoring using CIP with BOND structure using WSN.To control snoring with assisting technology and it will be used as an effective healthcare measure.To recover the person from snoring by continuous monitoring and support with WSN based assistive training.

EXISTING SYSTEMS

Surgical treatments for snoring(Existed):

- **Laser-assisted uvulapalatoplasty (LAUP):** LAUP reduces tissue in the soft palate and improves airflow.
- **Radiofrequency ablation:** Also called Somnoplasty®, this technique uses radiofrequency energy to shrink excess tissue in the soft palate and tongue.
- **Septoplasty:** This procedure straightens a deviated septum in the nose. A septoplasty

improves airflow through the nose by reshaping the cartilage and bone.

- **Tonsillectomy and adenoidectomy:** The surgeon removes excess tissue from the back of the throat (tonsillectomy) or the back of the nose (adenoidectomy).

So,to avoid the surgical treatments, we can use these wireless sensor network for heavy breathing control detection system to control and stop our snoring problem earlierly.

Non-Surgical treatments for snoring(Devices):

- Breathe Right Nasal Strips
- Snorepin Anti Snoring Aid
- Zzoma Positional Therapy
- Philips SmartSleep Snoring Relief Band
- Smart Nora Pillow Insert
- SleepNumber Wedge Pillow
- JISULIFE Portable Humidifier

These are the some devices which are existing products to stop the snoring.

PROBLEM STATEMENT

When you breathe, you push air through your nose, mouth and throat. If the airway is restricted, tissues — including the soft palate (the back of the roof of the mouth), tonsils, adenoids and tongue — vibrate against each other as you force air through. The vibrations make a rumbling, rattling noise. Several conditions and factors can block airflow. These include:Alcohol and other sedatives that relax muscles, restricting airflow,Bulky soft tissue, including enlarged adenoids, tonsils or tongue,Excess body fat, which puts pressure on the soft tissues and compresses the airway,Pregnancy hormones that cause inflammation in the nose,Low muscle tone and muscle weakness in the mouth, nose or throat,Nasal congestion and inflammation due to a cold, flu, allergies or irritants in the air,Structural differences in the mouth, nose or throat that decrease the size of the airway.Snoring sounds range from quiet vibrations or whistles to very loud grumbling, snorting or rumbling. Some people might not realize they're snoring when they sleep. People who snore may toss and turn at night, have a dry, sore throat when they wake up and feel tired during the day. Lack of sleep can cause headaches, difficulty focusing and moodiness. Besides snoring, some people gasp for air and stop breathing for a few

seconds while they're asleep. These are signs of sleep apnea, a disorder that leads to serious health problems if it isn't treated.

Snoring happens when air can't flow easily through the mouth or nose. When the air is forced through an obstructed area, soft tissues in the mouth, nose and throat bump into each other and vibrate. The vibrations make a rattling, snorting or grumbling sound.Snoring can interrupt sleep. Loud, long-term (chronic) snoring can be a sign of a serious disorder called obstructive sleep apnea. A wide range of surgical and nonsurgical treatments can stop or reduce snoring. For example, considering people with asthma or chronic obstructive pulmonary disease, the environmental conditions directly affect their breathing, and a wearable device is able to continually measure air quality and pulmonary function . The device could trigger alarm functions for drug uptake, contact a general practitioner for an appointment, or call emergency services.The measurement of air quality is important, as pollutant exposure can lead to acute asthma attacks . This happens usually after days under exposure. If a system detects pollutant exposure, it can warn the person and help to prevent attacks. To avoid these problem we're developed the wireless sensor network for heavy breathing control detection system to cure the snoring problem.

PROPOSED SOLUTION

The creation of these wireless devices requires understanding the anatomy and physiology of the respiratory system. The knowledge about its structure and function leads to the development of devices that do not interfere with respiratory mechanics or daily life activities. It also allows selecting the best sensors in each case. Therefore, it is important to have an overview of the main types of electronic sensors used in recent years and how they have been applied, as well as signal processing and machine learning methods.A system is defined which identifies snoring at the initial stage.Records the sleeping position, body movements, respiratory range rate, heart range rate.Once snore is identified, then the sleeping position is analyzed.Based on the analysis , the user will be made to change his sleeping position to an non snoring position with the help of an assisting device and information passed to Doctor.The stress rate will be monitored by using the various factors measured and an analysis will be made on the stress rate.The user with be assisted by an device to overcome the difficulties faced during the change in sleeping position.In future days, the human brain will be trained automatically to change the sleeping position to prevent snoring.

A continuously monitoring device which recognize snoring from the initial stage and provide diagnostic results for controlling snoring by using WSN.Support the user to reduce the stress level, by providing an uninterrupted sleep throughout the sleeping time by using an assistance device.Allows the user to get trained for overcoming the snoring behavior by adjusting their physical movements.

FLOWCHART
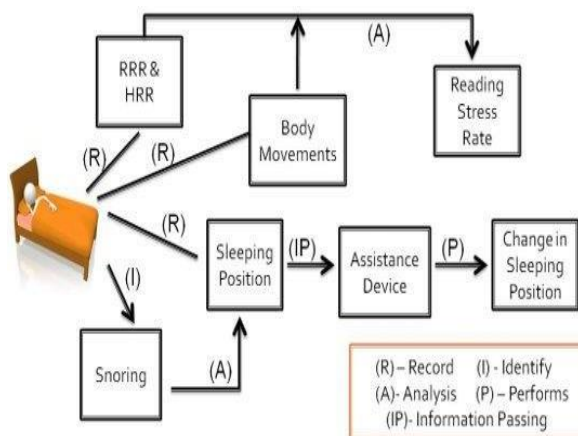
CONCLUSION

Wireless devices for breathing monitoring and pattern detection are not simple devices. They must not interfere with the respiratory system activities and need to be highly immune to external perturbations. The understanding of the respiratory mechanics is crucial to the development of wireless sensors, and to know how to connect them in an optimal way. The methods, whether manual processing or the use of machine learning algorithms, depend substantially on the type of the signal studied and are a crucial step for a study development.These device will help you to control the snoring and stop these problem earlierly.And it will help you to sleep good at night and you're free from your breathing problem.

You might be able to prevent snoring by changing your lifestyle, diet and daily activities. To reduce snoring, you should:Ask your provider about medications to relieve nasal congestion,Avoid alcohol and other sedatives before bed.,aintain a weight that's healthy for you, stay active and get plenty of exercise,Raise the head of your bed a few inches to change the angle and improve airflow,Sleep on your side, not your back,Try a snore-reducing pillow that keeps your head and neck in the proper position when you sleep.

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To trace nearby ambulances using GPS Single-point locating method

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I.ABSTRACT

The primary technology of GPS-based vehicle tracking improved public service. Android phones are now widely used and have sold the most globally due to their enormous feature set. System for precisely locating the user's location and the location of the ambulance driver. Because the ambulance is unable to reach them in time, approximately 33,000 people die. That is not required when calling an ambulance. You will be rescued by the nearest ambulance. A model for using the global positioning system to locate the nearest free ambulance in the area and bring it to the person in distress is described in the paper. The ambulance's GPS (Global Positioning System) unit will calculate the coordinates of each position and can be retrieved whenever the server requests it. As a result, it is able to locate the nearest ambulance and bring it to the injured person. Utilizing a GPS transceiver system to determine the vehicle's current location, the purpose of a tracking system is to manage the control transport system.

Index Terms - Medical health monitoring, Ambulance, Android application programming interface, GPS module.

II. INTRODUCTION

Instauration of mobile devices gave birth to lot of innovative technology, and exchanging information globally has become more prominent. Smart phones gave a new dimension to the usage of mobile phones for the users. Apart from basic functionality such as messaging, calling and cameras, smart phones laid a way to portray a personal computer. Not only the mobile phone looks newer, it's the operations system and the applications which are built to meet the various features of the hardware made difference.

The mobile phone has now become a major source of information device which can be seen almost in everyone's hand in the world. Mobile devices with computing process ability have been widely used to access network via mobile communication network. Different categories of application such as games, social networks, and health care are being developed to meet the user's requirements. Each mobile user is of unique kind, one wants to use the basic functionality of the smart phones, the other want to use the built in application, the most advanced user who wants to play with the hardware and to develop his own customizable application. To answer each kind of user, Google mustered up a ground breaking product called as "ANDROID", which includes an open source operating system, middleware and a user-interface.

Mobile communication allows transmission of voice and multimedia data via a computer or a mobile device without having connected to any physical or fixed link. Mobile communication is evolving day by day and has become a must have for everyone. Mobile phones are gradually reducing the problem in communication and many day to day life application and other services anywhere and anytime. There are a lot of applications like call management and others but this application which is android based is more customized and most simplified of all. All kinds of security and authentication is provided in this application so that only appropriate user can make changes or handle the application. Also there is no such application available in android having multiple modules working together. This application is basically designed for android mobile phone users. In this application all the features that a mobile phone user need for easy and reliable communication are provided. Also we have chosen Android platform because Android has lots features that other mobile operating systems don't have. The basic difference between the android operating system and other system is that android has Dal vik virtual Machine. Also it using very light weight database known as SQLite. That will help it to speed up the performance. In android you can open multiple screens and can easily switch between one another.

'Intelligent Communicator' is an application developed on the Android platform for android mobile phone users. This application uses Android as its base along with GPRS, GPS and GSM services. It may happen that you don't want to receive calls/messages from a particular person; our application allows you to do so automatically. It also may happen that you are be busy somewhere and not able to receive a call from a particular person. In such a case this application automatically sends predefined message to that particular person. You can also save remainders for sending messages to particular person on a particular day at a particular time. While you are on a trip and need to inform your dear ones about your whereabouts, you can do so using our application. Our application would use GPS and track your location (Exact area) and send message of the same to your dear ones on a regular interval.

Ambulance Tracking and Task Management System is a special solution for the management of the ambulances on the mobile environment by tracking, task assignment and obtaining Patient Location from Driver End. System enables faster and efficient use of the resources by quick registering the information related with the patients and their relatives/friends/Somebody else, searching and locating the patient address on the digital map to help saving lives. Thus, resources can be used in the most efficient way and the service quality can be upgraded. Introduction of Smart phones redefined the usage of mobile phones in the communication world. Smart phones are equipped with various sophisticated features such as Wi-Fi, GPS navigation, high resolution camera, touch screen with broadband access which helps the mobile phone users to keep in touch with the modern world. Many of these features are primarily integrated with the mobile operating system which is out of reach to public, by which the users can't manipulate those features. Google came up with an innovative operation system termed as ANDROID, which is open system architecture with customizable third party development and debugging environment which helps the user's to manipulate the features and to create their own customizable applications. In this thesis, Emergency Based Remote Collateral Tracking System" application using Google's Android Mobile Platform is addressed. Emergency is divided into three categories: heart beat based emergency, security threats like personal safety and road accidents. This application is targeted to a person who is driving a vehicle. Heart rate monitoring device is integrated with our application to sense the heartbeat of a person driving the vehicle and if there is any abnormalities in the heart beat, then our application performs a dual role. One in which, application uses a GPS to track the location information of the user and send those location information as a message via SMS, email and post it on Face book wall Simultaneously, an emergency signal is sent to Microcontroller.

III. LITERATURE SURVEY

There are no subscription fees or setup charges to use GPS [1]. GPS was invented by the U.S. Department of Defense (D.O.D) and Ivan Getting, at the cost of twelve billion taxpayer dollars. The Global Positioning Sys-tem is a satellite navigational system, predominantly designed for navigation. GPS is now gaining prominence as a timing tool [2]. Eighteen satellites, six in each of three orbital planes spaced 120º apart, and their ground stations, formed the original GPS. GPS uses these "man-made stars" or satellites as reference points to calculate geographical positions, accurate to a matter of meters. In fact, with advanced forms of GPS, you can make measurements to better than a centimeter [3]. GPSs are very quickly becoming a standard in most new automobiles, and are even finding their way onto a variety of new cell phones. The mapping devices can come in handy under a variety of circumstances. If we are thinking about purchasing a GPS or a device that has a GPS built-in, here are some of the benefits of having one [4]. A GPS can help us to determine exactly where we are at any given moment. Not only can a GPS give us the name of the street we might be traveling on, but many GPS systems can also give us the exact latitude and Longitude of where you are located. On the other hand, Android mobile platform is becoming more popular to the users for its multi-dimensional purposes. Thus, this proposed system namely "GPS-based Location Tracking System via Android Device" uses GPS and any mobile phones having an Android operating system to track the location of a person whenever necessary. An Improved A* Algorithm Applicable for Campus Navigation System[5]. With a increasing number of College Admissions activities, education and search heuristic for real time ambulance relocation[6]. This paper considers the redeployment problem for a fleet of ambulances. This problem is encountered in the real-time management of emergency medical services. A dynamic model is proposed and a dynamic ambulance management system is described. A Novel Emergency Vehicle Dispatching System[7]. One of the main issues in the event of a major industrial disaster (fire, explosion or toxic gas dispersion) is to efficacy manage emergencies by considering both medical and logistics issues. From a logistics point of view the purpose of this work is to correctly address critical patients from the emergency site to the most suitable hospitals.

IV. PROBLEM STATEMENT

There are four major smart phone operating systems which rule the mobile world namely, Symbian, Windows, iPhone OS and Android. Out of them, Android is a new and yet dynamically developing mobile platform and almost all counterpart of application are being adopted to compact the system's requirement. GPS is one of the notorious applications. The use of GPS on mobile devices in the recent generations of mobile communication is one of the ubiquitous applications that are widely developed and used. But using those GPS in case of emergency where there is no user interaction will be an arduous effort and hence

ANDROID can answer for this, by developing an application which can solve the above mentioned problem.
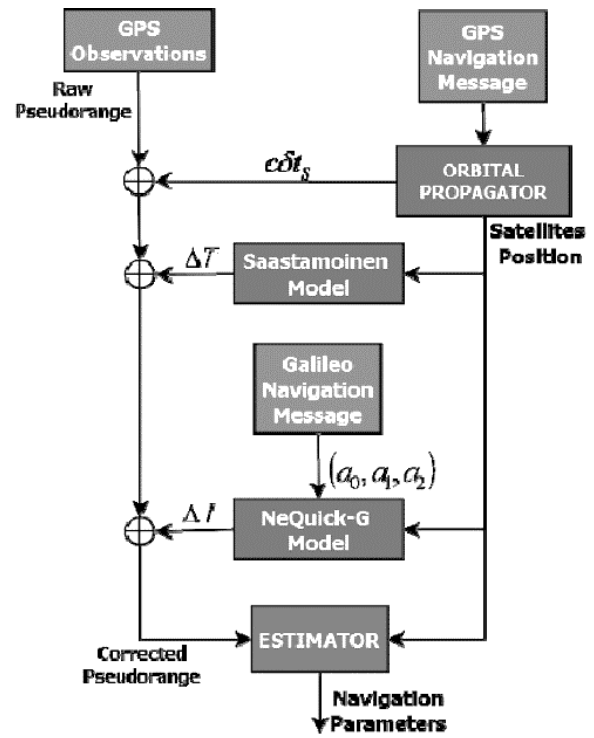
V. ALGORITHM
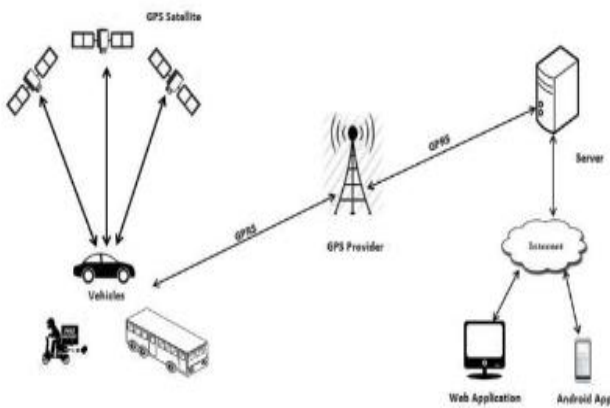
GPS Single Point Positioning Algorithm:

Originally, GPS has been designed to perform single point positioning (SPP). SPP use code measurement to perform absolute positioning, in real time or in post processing, in kinematic or static mode.

The ionospheric and tropospheric errors are corrected using models. Usually, the coordinates and clock error are computed from code, it is "mass-market" positioning technique.

In single point positioning coordinates of a receiver at an "unknown" point are sought with respect to the earth's reference frame by using the "known" positioning of the GPS satellites being tracked. GPS system based on pseudo-range measurement. And there is four unknown parameter. But the navigation observation equation is nonlinear. The nonlinear equation can be solved by least square iterative algorithm. The algorithm is based on linearization by taylor model.

A. Block Diagram

The Accident place can be located by the ambulance driver by the GPS provider from the place where the place stored by server. The server can find the location with the help of GPS satellite.

The GPRS (General Pocket Ratio Services) can send the signal to the where the emergency location to accessed by the satellite.

B. Working

Some of you may wonder why ambulance tracking is so important. But actually 10-second delay may decide the life or death of a person. We are familiar with the concept of an emergency ambulance, an ambulance which is used to move patients rapidly to critical care in an emergency room under required medical condition. They can also be used for routine transport of non-urgent cases, such as transfers between hospitals and nursing homes and accidents. In most nations, ambulances are given priority on the road, in recognition of the fact that time is important when moving a critically ill or seriously injured patient. So Ambulances are critical tools in helping EMTs and other trained first responders not only quickly arrive at an emergency but also provide potentially life-saving measures.

VI. MODULES

1. Transmitting Unit:

Transmitting Side contains Android mobile which has inbuilt GPS, GSM modem and GPRS functionality. Therefore the mobile will be used as transmitting unit.

GPS stands for Global Positioning System. The Global Positioning System (GPS) is a satellite radio navigation system developed by the Department of Defense (DoD) owned by the United States Government (USG) and operated by the United States Air Force (USAF). GPS has provided positioning, navigation, and timing services to military. An unlimited number of users with a civil or military GPS receiver can determine accurate time and location, in any weather, day or night, anywhere in the world. The system makes use of a medium earth orbit satellite constellation transmitting microwave signals

345

allowing a GPS receiver to determine its position, velocity and time. Different types of positioning can be carried out using GPS receivers depending on the algorithms; type of measurements and corrections used in the navigation solution. GPS is a main module in this Vehicle tracking system. As vehicle is tracked using GPS technology. Author has used it to get the exact location of respective vehicles. But to get exact location of any vehicle it need to be in a focus of four satellites.

GSM is a Global System for Mobile Communications. It is developed by European Telecommunications Standards Institutes (ETSI).It describes the protocol for Second Generation digital cellular networks. A GSM modem is wireless modem that works with a GSM wireless network. It behaves like a Dial-up modem. The working of GMS modem is based on commands; The Commands always start with <AT> (Attention) and finish with a <CR> CRacter. The AT Commands are given to the GSM Modem with the help of PC or Controller. In Vehicle tracking system author is using GSM service for communication between all three modules.

2. Monitoring unit:

Monitoring unit is an Android Application through which user will get to know the actual position of proposed vehicles. This android provides the user interface through which user communicate with system. It provides login to the system. After login to the system user is will get Google map with exact location of vehicles.

3. Tracking Device:

The tracking device will continuously request to the GPS satellite for its location information. At the same time GPS satellite will provide the location information to tracking device installed in vehicle. The tracking device will send the location information back to the server through GPRS and continuously update the database.

4. Monitoring Device:

Monitoring device will continuously access the database from server. From that database the location information will be plotted on Google maps.

Hardware requirements:

- PROCESSOR   : Intel i3 2.4 GHz
- Hard Disk   : 250 GB.
- Monitor   : 15' LCD MONITOR.
- MEMORY   : 2 GB.
- N/W ADAPTER : 802.11AC 2.4/5 GHz.
- OTHER'S   : KEYBOARD, MOUSE

Software requirements:

- OS   : W 7, 8, 10(x64)
- LANGUAGE   : JAVA BASED ANDROID
- FRONT-END   : XML DESIGN
- DATA BASE   : MSSQL SERVER 2008

VII. CONCLUSION

Those old day are gone where they use to call the ambulance and ask them to come to the user's location to take the patient to the hospital. As everything is available at a user's finger tips implementing it would help save a lot of patience life as the ambulance can be tracked at any location from the user's location. In the future this application can be upgrades to the next level by making it more interactive in such a way that during the time Accident user will send request to Ambulance which can be stored on the cloud, then once the ambulance reach patient using GPS, then the ambulance reaches the hospital in short time period and treat the patients and Save life.

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Medical image classification based on Neighboring Pixel Centered Sparsity Classification method with an Optimization Algorithm

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Abstract:

The Single sensor image cannot provide the necessary information for the medical diagnosis to the doctors. Images with different modalities are combined to obtain the complete information of affected organs or tissues and the efficient results makes it possible to achieve complete evidence on the tissues or organs affected. The Computer Tomography (CT) images and Magnetic Resonance Imaging (MRI) images are taken for used in this paper and the obtained images produces better visualization as compared to single images. But still, the image classification is needed to improve the quality of visualization. So, neighboring pixel centered sparsity classification method with Artificial Bee Colony Optimization (ABC) has been proposed in this paper to enhance the quality of visualization. Spare representation of the pixels in the fused images are considered in this algorithm by using some of the training samples from the fused image. From the sparse vector and training samples with respective weights, the process of sparse representation is proceeded. Approximation errors present in the sparse vector is eliminated by Artificial Bee Colony Optimization (ABC) Algorithm. By using this algorithm class label of the test sample have been estimated. The proposed method achieved good accuracy and improved F_1 score. From the results of experiments, it is obtained that this algorithm performs well as compared to the conventional classifiers like support vector machine (SVM), K-means and fuzzy.

Keywords: Fused image, sparsity, classification, sparse vector, Artificial Bee Colony Optimization, Neighboring pixel

1. Introduction

The wider approaches of medical image fusion and general data fusion for addressing the medical problem reflected by the human body images, organs and cells. In the medical diagnostic area, the imaging technology applications are growing and there is a historical documentation. As computer aided imaging approaches starts to assess the images quantitatively under examination, it aids towards the efficiency improvement of medical practitioners at the arrival of objective and unbiased decision in small timing span [1,2].

Medicinal diagnosis has also been improved by the image fusion application. CT, MRI, PET, ECT, and

SPECT are some of the applications used for medical image fusion. These several images have its individual range of application. Lower spatial resolution is relatively present in this process and produces information with respect to blood circulation and visceral metabolism. High spatial resolution like CT, MR, B-mode, ultrasonic etc., are the anatomical images present in this process. Anatomical images and functional images are combined in medical fusion image as an image. Numerous information is comprised in the fused image and it is used for diagnosing disease by the doctor [3,4].

The Signal sparsity are the highly extreme powerful tool in several traditional applications of signal processing like denoising and compression as maximum natural signals are represented compactly by some coefficients which carries highly important data in some dictionary or basis. Later, representation of sparse data applications has prolonged to the computer vision's area and pattern recognition having the compressed sensing (CS) framework enhancement and the images and signals are sparse modelled [5]. The observation of natural signal's highest dimensionality and the signals with similar Classfiying in low-dimensional subspace forms the basis for these applications [6,7].

One of the meta-heuristic algorithms based on swarm intelligence called Artificial Bee Colony (ABC) to optimize the mathematical issues. Intelligent honey bee's behavior was inspired by these optimization techniques. The foraging honey bee colonies behavior used by this model and forms the basis for this algorithm. Three necessary components are comprised in this model: Unemployed foraging bees and employed foraging bees for rich sources of food, that the 3rd components are closer to their hives. This algorithm describes 2 necessary behavioral modes of collective intelligence: forager's recruitment for rich sources of food resulted in positive feedback and desertion of poor source by foragers producing negative feedback [8]. However, this paper is contributed towards the design of classification model for fused CT and MRI image by using Neighboring pixel centered sparsity classification method, optimize the results of classification using ABC Optimization algorithm for enhancing the classification accuracy and the performance of classification is compared with the existing methods like SVM, K-means and fuzzy logic.

The rest of the paper is organized as follows: Section 2 describes the related works. The system model is determined in section 3. Section 4 demonstrated results and discussion. Finally, Conclusion and future scope is presented in section 5.

2. Recent research works

In [9] multi-mode medical image fusion depending on deep learning was presented as per the multi-modal medical image characters, technology with respect to medical diagnosis and practical implementation for meeting the necessities of medical analysis. From the results of experiments, this model's superiority is achieved depending on the visual quality and a diversity of estimation principles.

In [10], the algorithm for multimodal medical image fusion was presented for the problem of medical diagnosis in the wider range. The strategy of pulse-coupled neural network fusion is measured by boundary application and the strategy of energy attribute fusion in the domain of non-subsampled shearlet transform.

This algorithm is validated qualitatively and quantitatively and it performed superior to the existing algorithm comprising significant medical diagnosis ideas.

The hyperspectral pixels are analyzed effectively by RNN method was presented in
[11] and the categories of information are determined by the reasoning network. PRetanh was used by modified gated recurrent unit for hidden representation and it is accepted towards the recurrent layer construction in this network for efficient processing of hyperspectral data and entire no. of parameters are reduced. From the results of experiment, 3 airborne hyperspectral images propose modest performance in this mode.

For the classification of hyperspectral images, convolutional filters called Gabor filters are presented in [12]. Spatial information was extracted efficiently by Gabor filtering incorporating edges and textures that decreases CNN's FE burden. The results obtained revealed the method providing the outcomes with respect to accuracy of classification, particularly available with limited number of training samples.

The procedures of pre-trained and fine- tuning are regularized by a

novel diversified DBN was presented by [13]. Efficient implementation are pretrained and fine-tuned with regularization by the framework of normal recursive greedy and back-propagation learning. The real-world experiments of hyperspectral images described by previously promoted diversity in both pretrained and the process are fine-tuned leading to DBNs learnt with highly diverse latent factors, that directly making diversified DBNs for obtaining more results than initial DBNs and it is compared and best performance results are obtained with the existing methods of classification.

The method of deep feature extraction depends on siamese convolutional neural network (S-CNN) was used in [14] for the performance evaluation in classifying the hyperspectral image (HSI). Margin ranking loss function in S-CNN is present in this technique and it is considered as a significant characteristic with the extraction of highly discriminative features for the task of classification. From the results of experiments, feature extraction method with linear SVM classifier with improved performance of classification than the traditional approaches.

PCA-based EPFs (PCA-EPFs) technique for classifying HSI is presented in [15]. The stacked Edge-preserving features (EPFs) with spectral dimension is decreased by means of PCA that denotes EPFs in mean square sense and also pixel's separability is highlighted by EPFs.

Dimensionality Reduction Regression (DRR) method was established in [16]. Several techniques of

dimensionality reduction with respect to the accuracy of classification and feature extraction for HIS. Most of the feature extraction approaches are used commonly like PCA, LPP, MDS, kernel PCA, DRR were utilized for HIS.

Multiple deep convolutional neural networks (DCNNs) by means of synergic deep learning (SDL) was presented in [17]. End-to end model by the error's classification from DCNNs and synergic errors from DCNN's each pair. This SDL technique provides better performance than the existing system in the tack classification of medical images.

The algorithm dependent on CNN based on the dataset of chest X-ray was used for classification of pneumonia was presented

[18]. The SVM classifier with orientation free features, local rotation, transfer learning on two CNN models called VGG16 and InceptionV3 and the training of capsule network from scratch. From the experimental results, it is proved that data augmentation was an efficient manner as compared to the existing algorithms for performance improvement.

An algorithm for classification of medical image dependent on multi-scale non- negative sparse coding was presented in [19]. The features obtained by features of multi- scale non-negative sparse coding are fused to achieve a histogram feature at multi-scale because of medical image representation. From the results of experiments, it is demonstrated that this method efficiently use contextual spatial information and multi-scale of medical image decreases the semantix gap with larger degree and the performance of classification of

medical image was improved.

Multiscale geometric examination of non subsampled contourlet transform (NSCT) was adopted by multimodal medical image fusion approach by the techniques of type-2 fuzzy logic was presented in [20]. High- frequency sub bands fusion with an efficient type-2 fuzzy logic was presented. High- frequency coefficients are selected automatically by the local type-2 fuzzy entropy. Both the objective and subjective evaluation obtained efficient contrast, accuracy and versatility in this technique as contrasted with existing methods.

In most of the existing system image smoothening is performed to achieve the improved accuracy and achieves accuracy up to some extent. To improve the classification accuracy Neighboring pixel centered sparsity classification method with artificial bee colony

optimization was proposed in this method

3. System Model

In the proposed method, the feature extraction is performed by Non parametric weighted feature extraction and feature vectors are obtained. Afterwards, the classification is performed by Neighboring pixel centered sparsity classification method with the training data and feature vectors. Artificial Bee Colony (ABC) Optimization is used to optimize the data. Figure 1 represents Proposed Classification Architecture based on Neighboring pixel centered sparsity classification method with artificial bee colony optimization.
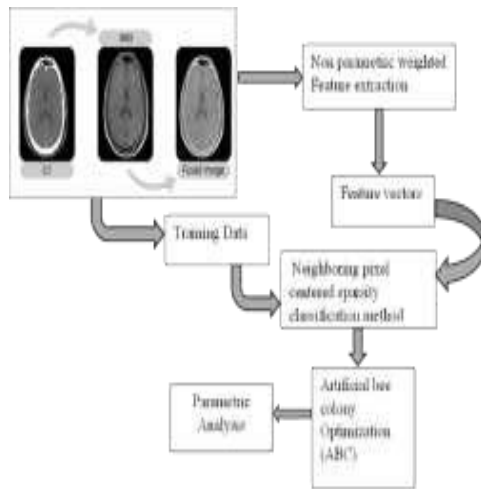
Figure 1: Proposed Classification Architecture based on Neighboring pixel centered sparsity classification method withartificial bee colony optimization

4. Optimization Algorithm

The strategy of swarm intelligence optimization to solve multivariable problems of optimization, Artificial Bee Colony (ABC) algorithm was utilized. This model is taken as self-organization method based on bee colonies. Three major elements are comprised in this ABC optimization, they are sources of food, employed bees and it is also called as leading bees and unemployed bees. Scouts and onlookers are the two unemployed bee types. Three different behavior patterns are produced, they are food searching bees, attract bees, bees that unrestraint sources of food. A particular source of food related to employed bees as they are exploited and employed. In the hive, onlookers are provided with the food source's evidence by the food searching bees and the onlookers share the information with

other bees. In the area of dance, the onlookers wait to select the source of food. By the method of roulette wheel selection, the source of food is assigned. The food source abandoned by the employed bee and this turns in to scout bee and random search is started for searching the new source of food in the surrounding areas. The population based on iteration was formed by incessant iteration, good individuals are retained by this algorithm and inferior individuals are eliminated and the global

optimal solution was approximated. Depending on ABC benefits, fused image classification is done.

4.1 Steps involved in ABC optimization are as follows:

1st Step: Individual Representation: Position of bee or particle composes the individual and D dimensional vector is represented by X called $X = x1, x2, x3, \dots . xD$. The extracted features from the fused image are represented by D.
The feature values are represented by $x1, x2, x3, \dots . xD$

2nd Step: The initial population is initialized in the random searching space. The original population is collected of N individuals; every X individual is in D dimension.

3rd Step: Fitness values evaluation: Fitness value is estimated on the classification basis and accuracy of classification is accomplished.

4th Step: The condition of termination is

encountered and then optimum solution was selected. Or else, continue. Favorite accuracy   was acquired by the condition of termination or extreme number of cycles.

5th Step: Update the population as per ABC:
 New positions were assigned to first half bees in random manner and last position and new position was selected as per the least fitness. Select the bee's position with least fitness.

6th Step: 5th Step is executed repeatedly till meeting the condition of termination. Condition of termination with desired accuracy or maximum number of cycles.

 Step 7: Stop the algorithm when the maximum possible accuracy is achieved.

4.2   Pseudo Code for the proposed system

Step 1: Initialize weights and local mean
$^{(i)}$and $W_j(x^{(i)})$
Step 2: Initialize scatter matrix weightλk
          (i,j)
Step 3: Calculate mean distance from a to b
Step 4: If scatter matrix weight λk $(i,)<$ 1
    {
    $dis(xk,(i), Wj(xk(i)))<1$
    Else
    $(i, j)\lambda k< 1$
    {
    $dis(xk(i), Wj(xk(i)))>0$
    }}

Step 5: Calculate the function of local mean
Step 6: Calculate nonparametric within-class

scatter matrix
Step 7: Obtain the Nm dimensional vector
from feature vectors
Step 8: Obtain the training samples in the class m
Step 9: Initialize the sparse vector
Step 10: Classification of test sample x by α
Step   11:   Calculate   problem   of reconstruction
          and search the "α" sparse vector for
          a test sample x
Step 12: Define optimization problem as
$\alpha = argmin \, ||\alpha||_0$
Step 13: Calculate error tolerance
Step 14: Calculate minimal residual from Classification results

5.   Results and Discussion

    The performance assessment of the proposed system is performed by comparison of the existing classifiers like SVM, K-means and fuzzy logic. Accuracy, Precision, Recall and F1 score are the parameters used for performance evaluation.

Accuracy

    It is defined as the measurement of accurate values. The value measured should be close to the true value or standard values and the provided equation (19)
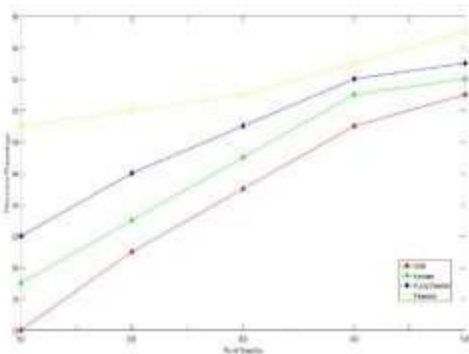
$$\text{Accuracy} = \frac{TP+FP}{TP+TN+FP+TN}$$

Table   1   describes   Accuracy comparison of proposed method with the existing SVM, K- means, Fuzzy Classifier and Proposed method

No	

of Samples	Accuracy(%)			
	SVM [19]	K-means [20]	Fuzzy Classifier[21]	Proposed
100	77	80	83	90
200	82	84	87	91
300	86	88	90	92
400	90	92	93	94
500	92	93	94	96

In figure 2 accuracy comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and Accuracy in percentage is represented in Y- axis. In this figure, SVM is indicated in red color, k-means

is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method.

Figure 2: Comparison of Accuracy

In this method highest accuracy if 96% is

achieved by proposed system and it is superior to the existing system.

Precision

The closeness of more than two measurements connected to each other is called as precision and it is defined in equation (20).

$$Precision= \frac{TP}{TP+TN+FP+FN}$$

Table 2 represents Precision of proposed method is compared with the existing SVM,K- means, Fuzzy Classifier and Proposed method Table 2: Precision of proposed method is compared with the existing SVM,K-means, Fuzzy Classifier and Proposed method

No of Samples	Precision (%)			
	SVM [19]	K-means[20]	Fuzzy Classifier[21]	Proposed
100	76	79	82	89
200	81	83	86	90
300	85	87	89	91
400	89	91	92	93
500	91	92	93	95

Figure 3: Precision Comparison
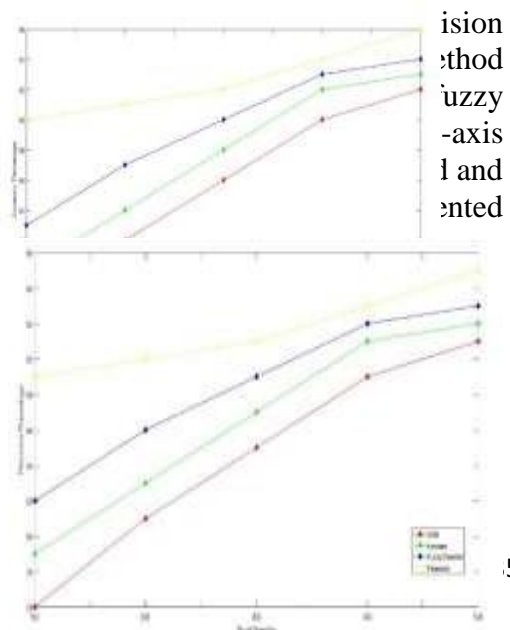
in Y- axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 95% is achieved by proposed system and it is superior to the existing system.

Recall

It is defined as the ratio of true positives divided by the total number of samples are defined in equation (21).

$$Precision = \frac{TP}{TP+FP}$$

Table 3shows Recall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Table 3: Recall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

No of Samples	Recall (%)			
	SVM [19]	K-means [20]	Fuzzy Classifier [21]	Proposed
10 0	7 8	8 1	8 4	91
20 0	8 3	8 5	8 8	92
30	8	8	9	93

0	7	9	1	
40 0	9 1	9 3	9 4	95
50 0	9 3	9 4	9 5	97

Figure 4: Recall Comparison

In figure 4 recall comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed.

In X-axis number of samples are represented and recall in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is

denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 97% is achieved by proposed system and it is superior to the existing system.

F1 score

It is called as **mean representation between precision and recall**. Performance rate is measured by this parameter. Table 4 describes F1 score comparison of proposed method with the existing SVM, K- means, Fuzzy Classifier and Proposed method

No of	F1-Score (%)

Samples	SVM	K-means	Fuzzy Classifier	Propos
100	75	78	81	88
200	80	82	85	89
300	84	86	87	91
400	88	90	90	92
500	90	91	91	94

Table 5describes Overall comparison of proposed method with the existing SVM, K- means, Fuzzy Classifier and Proposed method

Table 5: Overall comparison of proposed method with the existing SVM, K-means, Fuzzy Classifier and Proposed method

Parameters	SVM [19]	K-means [20]	Fuzzy Classifier [21]	Proposed
Accuracy	92	93	94	96
Precision	91	92	93	95
Recall	93	94	95	97
F1-score	90	91	91	94

In Table 5 F1 score comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In X-axis number of samples are represented and recall in percentage is represented in Y-axis. In this figure, SVM is indicated in red color, k-means is indicated in green color, fuzzy logic is denoted by blue color and the yellow color represents the proposed method. In this method highest accuracy if 94% is achieved by proposed system and it is superior to the existing system.

Overall Comparison

Figure 6: Overall Comparison

In figure 6, Overall comparison of the proposed method with SVM, K-means and fuzzy classifiers are performed. In the overall comparison clue color indicates accuracy, orange color represents precision, grey color represents Recall and yellow color represents F1 score. The proposed method achieved 96% of accuracy, 95% of precision, 95% of recall and 94% of F1 score.

6. Conclusion

In this paper, CT images and MRI images are taken for fusion and the obtained images produces better visualization as compared to single images. But still, the fused image is needed to enhanced in quality of visualization. Neighboring pixel centered sparsity classification method with ABC has been proposed in this paper to enhance the visualization quality of fused image. Spare representation of the pixels in the fused images are considered in this algorithm by

using some of the training samples from the fused image. From the sparse vector and the training samples with its respective weights, the process of sparse representation is proceeded. Approximation errors present in the sparse vector is eliminated by Artificial Bee Colony Optimization (ABC) optimization. By using this algorithm, class labelling of the test samples have been determined. The proposed method achieved 96% of accuracy, 95% of

Overall Comparison
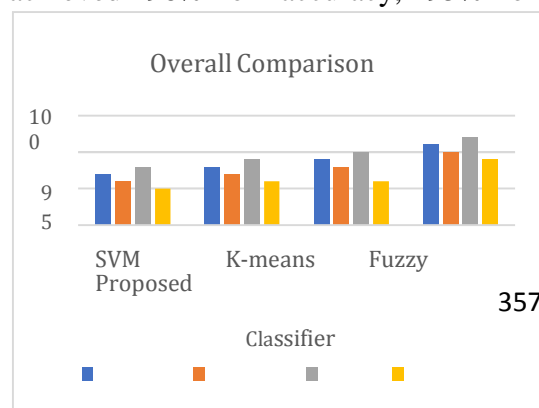
precision, 95% of recall and 94% of F1 score. From the results of experiments, it is obtained that this algorithm performs well as compared to the conventional classifiers like support vector machine (SVM), K-means and fuzzy. In future studies, the classification accuracy is further improved by the artificial intelligence methods

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DISTINCT WEB SEARCH ENGINE WITH REDUCING AMBIGUITY WORD COMPLEXITY

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Abstract— Searching is one of the common mission accomplished at the Internet. Search engines are the primary tool of the net, from in which you'll be able to acquire associated information and searched in step with the required key-word given by way of the person. The statistics at the internet is developing dramatically. The consumer has to spend more time inside the internet a good way to locate the precise data they may be inquisitive about. Existing internet system do not remember particular needs of user and serve every person similarly. For this ambiguous query, a number of documents on awesome topics are returned by way of engines like Google. Hence it turns into difficult for the consumer to get the specified content material. Moreover it also takes extra time in searching a pertinent content. Privacy based totally Personalized Web Search Engine is considered as a promising answer to address these problems, considering the fact that distinct search outcomes can be furnished depending upon the choice and records needs of users. It exploits consumer records and seek context to learning in which experience a question refer. In order to perform Personalized Web seek it is critical to version User's hobby. User profiles are built to version person's need based on his/her web utilization information. This Enhanced User Profile will help the person to retrieve concentrated information. This paper proposes structure for constructing consumer profile and enhances the person profile the usage of historical past know-how. It can be used for suggesting suitable net pages to the person based totally on his search question and background expertise. And also put into effect the pruning set of rules to put off the consumer info from anonymous person for maintain the important thing phrase privacy. On other side we want to hide the privacy contents present in the person profile to place the privateness hazard under manage. User privateness may be provided in form of safety like without compromising the customized seek satisfactory.

Index Terms— *Search engine, Personalized web search, User profile, Greedy approach, Privacy*

I. INTRODUCTION

Web mining is the software of statistics mining strategies to discover styles from the World Wide Web. As the call proposes, this is information collected via mining the web. It makes utilization of automatic apparatuses to show and extricate data from servers and web2 reviews, and it lets in businesses to get to both organized and unstructured statistics from browser activities, server logs, internet site and hyperlink structure, web page content material and exceptional sources.

The aim of Web structure mining is to generate structural summary about the Web website and Web web page. Technically, Web content material mining mainly specializes in the shape of internal- record, whilst Web structure mining attempts to discover the
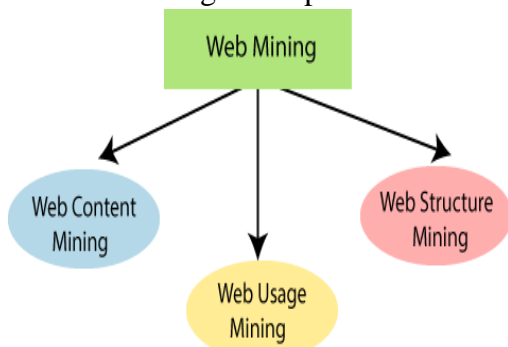
link shape of the links on the inter- record stage. Based on the topology of the hyperlinks, Web shape mining will categorize the Web pages and generate the information, which includes the similarity and courting among specific Web sites.

Web structure mining can also have some other route -- coming across the structure of Web report itself. This type of structure mining may be used to reveal the structure (schema) of Web pages, this would be proper for navigation reason and make it possible to examine/combine Web page schemes. This type of structure mining will facilitate introducing database strategies for

gaining access to data in Web pages by using providing a reference schema. Web mining may be divided into three different sorts – Web utilization mining, Web content material mining and Web structure mining.

Current net search engines like Google and yahoo are built to serve all users, impartial of the special desires of any man or woman user. With the exponential evolution of the available records on the World Wide Web, a traditional hunt engine, even though based totally on sophisticated report indexing algorithms, has trouble meeting efficiency and effectiveness overall performance demanded via customers trying to find applicable facts. Personalization of net search is to carry out retrieval for every user incorporating his/her pursuits. Personalized net search differs from time-honored web seek, which returns same consequences to all customers for same queries, regardless of various person hobbies and facts needs. When queries are issued to search engine, maximum go back the equal consequences to users. In truth, the giant majority of queries to search engines are short and ambiguous. Different users may additionally have absolutely one-of-a- kind records desires and desires whilst using exactly the equal question. Personalized net search can be completed by means of checking content similarity among net pages and user profiles. Some paintings has represented person pursuits with topical categories. User's topical pastimes are both explicitly specified by means of customers themselves, or can be robotically learned by using classifying implicit person facts. Search outcomes are filtered or re-ranked by means of checking the similarity of subjects between search outcomes and consumer profile. The web mining approach is shown in fig 1

Fig 1: Types of Web-mining

II. RELATED WORK

P. Yin, et.al,…[1] applied the look at of consumer perceptions approximately websites discloses that the most important layout functions for distinct website domains consist of navigations, timeliness, clarity, visualization, accuracy, and safety. The clean-to-navigate feature is ranked a few of the top three for all domains. Web customers look forward to extra at ease surfing reviews which require the WWW surroundings to be each powerful and efficient. Effective browsing method that the users can easily search the most interesting internet site by using specifying applicable key phrases, while efficient browsing indicates the users can reach the target web site in a website with just few clicks. Both necessities may be facilitated by the usage of the web mining techniques in the design segment. In this observe we advise a new system

for the internet site structure optimization (WSO) trouble based on a complete survey of present works and practice considerations. An moresuitable tabu search (ETS) algorithm is proposed with superior seek capabilities of more than one neighborhoods, adaptive tabu lists, dynamic tabu tenure, and multi-degree aspiration standards.

M. Chen, et.al,…[2] addressed the query of a way to improve the shape of a internet site in place of reorganize it appreciably. Specifically, we develop a mathematical programming (MP) version that helps consumer navigation on a internet site with minimum modifications to its current structure. Our version is particularly suitable for informational web sites whose contents are static and comparatively stable through the years. Examples of companies that have informational websites are universities, vacationer attractions, hospitals, federal businesses, and sports agencies. Our version, but, won't be appropriate for websites that basically use dynamic pages or have risky contents. While various strategies were proposed to relink webpages to improve navigability the usage of consumer navigation records, the absolutely reorganized new shape may be enormously unpredictable, and the price of disorienting users after the changes stays unanalyzed. This paper addresses the way to enhance a website with out introducing great modifications. Specifically, we endorse a mathematical programming version to enhance the user navigation on a website while minimizing alterations to its current structure. Results from massive checks conducted on apublicly available actual facts set suggest that our model now not best significantly improves the person navigation with very few changes, however also can be efficiently solved. We have additionally tested the model on big synthetic data units to demonstrate that it scales up thoroughly. In addition, we define two assessment metrics and use them to evaluate the performance of the progressed internet site the use of the real facts set. Evaluation outcomes confirm that the person navigation on the progressed structure is indeed substantially improved. More apparently, we find that closely disoriented users are much more likely to enjoy the progressed shape than the less disoriented users.

C. Kim, et.al,…[3] carried out the framework for performed excessive productiveness of publishing, the webpages in lotsof web sites are automatically populated by way of the usage of not unusual templates with contents. For human beings, the templates offer readers clean get admission to to the contents guided through constant systems despite the fact that the templates aren't explicitly introduced. However, for machines, the unknown templates are considered dangerous due to the fact they degrade the accuracy and overall performance because of the irrelevant phrases in templates. Thus, template detection and extraction techniques have obtained loads of interest these days to improve the overall performance of internet programs, such as information integration, search engines like google and yahoo, category of internet documents, and so on. Thus, template detection techniques have received a variety of attention recently to improve the overall performance of search engines like google, clustering, and category of net documents. In this paper, we present novel algorithms for extracting templates from a big variety of web files which are generated from heterogeneous templates. We cluster the net documents based totally on the similarity of underlying template structures inside the documents so that the template for each cluster is extracted concurrently. We increase a singular goodness measure with its fast approximation for clustering and offer complete evaluation of our algorithm. Our experimental outcomes with actual-life information units affirm the effectiveness and robustness of our algorithm in comparison to the state of the art for template detection algorithms.

Y. Yang, et.al,…[4] applied the facts extraction (IE) scheme which performs an crucial function in internet information discovery and management. The maximum essential obligations in facts extraction from the Web are web site structure expertise and herbal language sentences processing. However, little work has been done closer to an included statistical version for knowledge webpage structures and processing herbal language sentences within the HTML elements. Our latest work on web site expertise introduces a joint model of Hierarchical Conditional Random Fields (i.e. HCRF) and extended SemiMarkov Conditional Random Fields (i.e. Semi-CRF) to leverage the page structure information outcomes in loose text segmentation and labeling. In this pinnacle-down integration version, the selection of the HCRF version ought to manual the decision-making of the Semi-CRF model. However, the drawback of the top-down integration strategy is likewise

obvious, i.E., the choice of the Semi-CRF version couldn't be used by the HCRF model to manual its selection-making. This paper proposed a novel framework known as WebNLP, which allows bidirectional integration of page shape expertise and textual content information in an iterative manner. We have applied the proposed framework to neighborhood commercial enterprise entity extraction and Chinese character and agency call extraction. Experiments display that the WebNLP framework carried out significantly higher performance than existing methods.

J. Hou, et.al,…[5] advocate two algorithms that use web page similarity to discover applicable pages. The new page source, based totally on which the algorithms are hooked up, is constructed with required properties. The web page similarity evaluation and definition are based on link facts the various Web pages. The first set of rules, Extended Cocitation set of rules, is a cocitation algorithm that extends the conventional cocitation concepts. It is intuitive and concise. The second one, named Latent Linkage Information (LLI) set of rules, reveals applicable pages more efficiently and precisely by means of the usage of linear algebra theories, specially the singular price decomposition of matrix, to reveal deeper relationships most of the pages. This paper gives two link analysis-based totally algorithms to locate relevant pages for a given Web page (URL). The first set of rules comes from the prolonged cocitation analysis of the Web pages. It

is intuitive and easy to put into effect. The 2nd one takes benefit of linear algebra theories to expose deeper relationships some of the Web pages and to perceive relevant pages more exactly longer deal with the difficulty of noise in seek outcomes. In existing machine, the put in force the system that employ the customized web seek

and efficaciously. The experimental outcomes display the feasibility and effectiveness of the algorithms. These algorithms might be used for various Web programs, such as enhancing Web seek. The ideas and strategies on these pictures might be useful to other Web-associated researches.

III. EXISTING METHODOLOGIES

The current machine put into effect personalized internet seek for enhancing common experience and folksonomy primarily based smart seek systems. A large department of the cutting- edge web is characterized by user generated content material classified the use of collaborativetagging or folksonomy. It makes very tricky to look for suitable content material due to ambiguityin lexical illustration of principles and variances in preferences of users. A past effort to use this approach has shown encouraging results in obtaining applicable content however it does nowe compute the gap to the preceding nearest cluster. The point stays in its cluster, if the new distance is less than or same to the previous distance, and it isn't required to compute its distances to the alternative cluster centers. This saves the time required to compute distances to k- 1 cluster centers. "K-means algorithm is one in all first which a statistics analyst will use to investigate a new records set due to the fact it's far algorithmically easy, enormously robust and gives "true enough" solutions over a huge type of records sets." The K-means set of rules is the most normally used partitioned clustering algorithm because it could be effortlessly carried out and is the maximum efficient one in terms of the execution time.

The basic algorithm pseudo code as follows:

Input: X = {x1, x2, x3,…..,xn} be the set of data points , Y= {y1,y2,y3…yn} be the set of data points and V = {v1,v2,v3,….,vn} be the set of centers

Step 1: Select 'c' cluster centers arbitrarily

Step 2: Calculate the distance between each pixels and cluster centers using the Euclidean Distance metric as follows

$$Dist(X,Y) = \sqrt{\sum_{j=1}^{n}(X_{ij} - Y)^2} \qquad \text{-------}$$

Eqn(1)

method of traditional internet seek systems to pay attention on the issue of inappropriate seek effects in commonplace feel the usage of K-Means and Page Rank algorithm.

3.1 K-Means algorithm:

The K means a set of rules is easy to implement, requiring an easy records shape to hold some facts in every iteration to be used inside the next new release. The idea makes K-means more efficient, especially for dataset containing big number of clusters. Since, in every generation, the k-means set of rules computes the distances between data point and all facilities; this is computationally very high-priced particularly for huge datasets. Therefore, we do can use from preceding new release of k-approach algorithm. K-Means is one of the top ten clustering algorithms that are extensively utilized in actual global packages. It is a very simple unsupervised mastering algorithm that discovers actionable information by means of grouping comparable gadgets into numerous clusters. However, it wishes the range of clusters to be known priori. We can calculate the distance for each records factor to nearest cluster. At the next generation,X, Y are the set of data points

Step 3: Pixel is assigned to the cluster center whose distance from the cluster center is minimum of all cluster centers

Step 4: New cluster center is calculated using

$$V = \frac{1}{C_i} \sum{}^{ci} x \text{-----------Eqn(2)}$$

Where Vi denotes the cluster center, ci denotes thenumber of pixels in the cluster

Step 5: The distance among every pixel and new obtained cluster facilities is recalculated

Step 6: If no pixels were reassigned then stop. Otherwise repeat steps from 3 to 5

The flowchart of the algorithm is shown in fig 3.1

Fig
Li
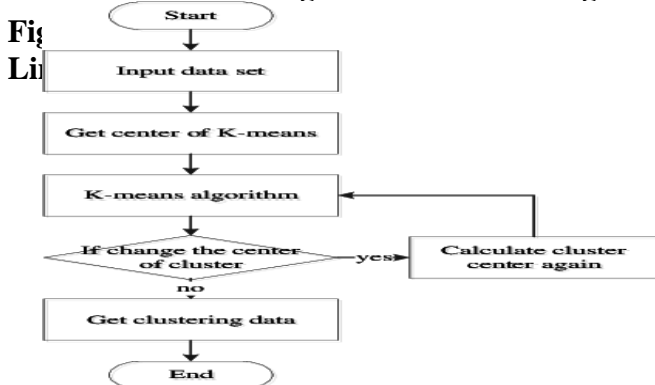
variety of clusters and the wide variety of iterations.

- The first-class of the ensuing clusters closely relies upon on the choice of initial centroids which reasons it to converge at

nearby finest.

- Empty clusters hassle, which arise to defined fixed cluster in staring of the set ofrules.

3.2 PAGE RANK ALGORITHM

PageRank (PR) is a set of rules utilized by Google Search to rank web sites of their search engine results. PageRank changed into named after Larry Page, one of the founders of Google. Itisn't always the handiest algorithm used by Google to order search engine outcomes, however it is the primary algorithm that was utilized by the agency, and it's miles the pleasant-acknowledged. The above centrality measure is not carried out forthe multi-graphs. The PageRank algorithm outputs a chance distribution used to symbolize the probability that a person randomly clicking on hyperlinks will arrive at any specific page. PageRank can be calculated for collections of documents of any length. It is believed in several studies papers that the distribution is lightly divided amongst all files within the collection at the beginning of the computational technique. The PageRank computations require numerous passes, referred to as "iterations", thru the gathering to regulate approximate PageRank values to greater carefully reflect the theoretical true cost. The size of every query is proportional to the full size of the opposite faces which can be pointing to it.

The pseudo code for the algorithm is:

Given a web graph with n nodes, where the nodes are pages and edges are hyperlinks

- ＿ Assign each node an initial page rank
- Repeat until convergence calculate the page rank of each node (using the equation in the previous slide)

PR(A) == (1-d) + d * (PR(T1)/C(T1)+…+ (PR(Tn)/C(Tn))

After all, the sum of the weighted page ranks of all pages Ti is multiplied with a damping factor d which can be set between 0 and 1. Thereby, the extend of page rank benefit for a page by another page linking to it is reduced

IV. PROPOSED METHODOLOGIES

Searching is one of the usually used venture on the Internet. Search engines are the simple tool of the net, from which related statistics may be gathered consistent with the desired query or key-word given by way of the consumer, and are extraordinarily famous for recurrently used websites. With the first rate development of the World Wide Web (WWW), the records search has grown to be a primary commercial enterprise phase of a worldwide, competitive and money-making market. An ideal search engine is the one

which need to journey via all the web pages inside the WWW and have to listing the related statistics based totally at the given user key-word. In spite of the current developments on internet seek technologies, there are nevertheless many conditions wherein seek engine users obtains the non-relevant seek effects from the search engines. A customized Web seek has numerous tiers of efficiency for distinctive users, queries, and seek contexts. This technique can help in offering greater applicable information for a particular consumer with the aid of reorganizing the search results from Web search. Hence it permits users to acquire the proper records in accordance with their hobby primarily based on Greedy algorithm.

Based on the hardness of the hassle, we use a greedy algorithm. Implicit statistics includes past sports as recorded in Web server logs through cookies or consultation tracking modules. Explicit facts generally come from registration bureaucracy and score questionnaires. Additional facts including demographic and application records (for example, e-trade transactions) also can be used. In a few cases, Web content material, shape, and alertness data can be introduced as extra assets of statistics, to shed extra light on the subsequent tiers. Data is often pre-processed to put it right into a format that is well matched with the evaluation approach to be used inside the subsequent step. Preprocessing can also include cleansing statistics of inconsistencies, filtering out irrelevant facts consistent with the aim of evaluation (instance: automatically generated

requests to embedded photos can be recorded in internet server logs, despite the fact that they upload little records approximately consumer pursuits), and completing the lacking hyperlinks (because of caching) in incomplete click on thru paths. Most importantly, specific periods want to be diagnosed from the exceptional requests, based totally on a heuristic, which include requests originating from an same IP cope with within a given time period. Analysis of Web statistics - Also called Web Usage Mining, this step applies device mastering or Data Mining strategies to discover thrilling usage patterns and statistical correlations among net pages and user organizations. This step frequently effects in

automated user profiling, and is normally implemented offline, so that it does no longer add a burden on the net server. The ultimate section in personalization uses the effects of the preceding analysis step to deliver recommendations to the person. The advice technique typically entails producing dynamic Web content on the fly, along with adding hyperlinks to the ultimate web page asked by the person. In the start, a person profile is randomly selected as the seed of a brand new cluster. The closest user profile is continuously selected and combined with the seed until the cluster satisfies p-linkability or the size of the cluster $|G_i|$ satisfies the constraint $|G_i| \geq |U|avg\ p$. At next step, a user profile with the longest distance to the previous seed is selected as the seed of the new cluster.

```
result ← ∅
C ← ∅
seed ← a randomly picked user profile from S
while |S| > 0 do
 seed ← the furthest user profile(with the min similarity value) to seed
 while C does NOT satisfy p-linkability AND |S|>0 do
 add the closest user profile (with the max similarity value) to C
 end while
 if C does satisfy p-linkability then result
 ← result ∪ C;
 C ← ∅ end if
end while
for each user profile in C do  assign it to the
closest cluster end for
```

The component to protect privacy is generating an online profile that is put into effect on a search proxy running on a client machine itself. This proxy will have the hierarchical user

profile and customized privacy requirements. Phases in this Architecture consists both online and offline phase. Hierarchical generation of user profile on client side and customized privacy requirements specified by the user are handled. The proposed work can be described as follows:

4.1 User enrollment

In this module, can construct user information system and includes admin and data users. Admin can be responsibility for maintain all records with secured manner. Admin provides approval system. Data users search information from server. User can be register with their details such as name, age, gender and other details.

4.2 User profile

This module introduces an approach to personalize digital multimedia content based on uses profile information. For this two main mechanisms were developed a profile generator

that automatically creates user profiles representing the user preferences. Profile generator can be used to predict the query whether it is common or personalized. Common query can consider as new search. And personalized search can be referred as already search query.

4.3 Repository creation

In this module used to create a repository for personalized search user can select a personalized web search they can accurate data from search. Once a user has entered a query, the query can be compared against the contextual information available to determine if the query can be refined to include other terms. If the query is on a topic the user has previously seen, the system can reinforce the query with similar terms, or suggest results from prior searches. Generically refers to a central place where data is stored and maintained. A repository can be a place where multiple databases or files are located for distribution over a network, or a repository can be a location that is directly accessible to the user without having to travel across a network. If it is a new topic, chances are the system should not augment the query, or if it does, it can help define what the topic is not about by providing a diverse set of results to the user. The final output of query augmentation is a more precise query that can be shown to the user and submitted to a search engine for processing.

4.4 Search module

In this module used to search data in this page. In this page provide search engine for user

to search data. User customizable privacy preserving search, it's the framework assumes that the queries do not contain any sensitive information, and aims at protecting the privacy in individual user profiles while retaining their usefulness for pws. In this section, the procedures carried out for each user during two different personalize a query. The basic idea is straightforward. If a distinct query is identified during generalization, the entire runtime profiling will be aborted and the query will be sent to the server without a user profile. In this page provide search result to user. User views their search result in this page. The proposed architecture is shown in fig 3.

execution phases, namely the offline and online phases. Generally, the offline phase constructs the original user profile and then performs privacy requirement. Customization according to user specified topic sensitivity can be determined. The subsequent online phase finds the optimal risk generalization solution in the search space determined by the customized user profile

4.5 Results

The study of the efficiency of the proposed generalization algorithms is quite realistic as it clearly seen from the output. Here we implement mp model on the profiles, which has an edge over other search engines. The queries are randomly selected from their respective query log. The profile-based personalization contributes little or even reduces the search quality, while exposing the profile to a server would for sure risk the user's privacy. To address this problem, we develop an online mechanism to decide whether to
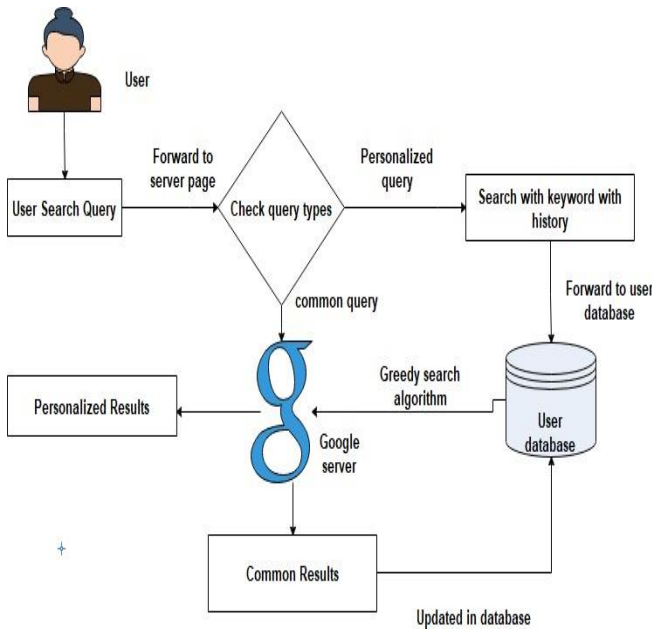
V. EXPERIMENTAL RESULTS

Implement the system using C#.NET as front end and SQL Server as back end. The personalized search results can be shown in fig 1.
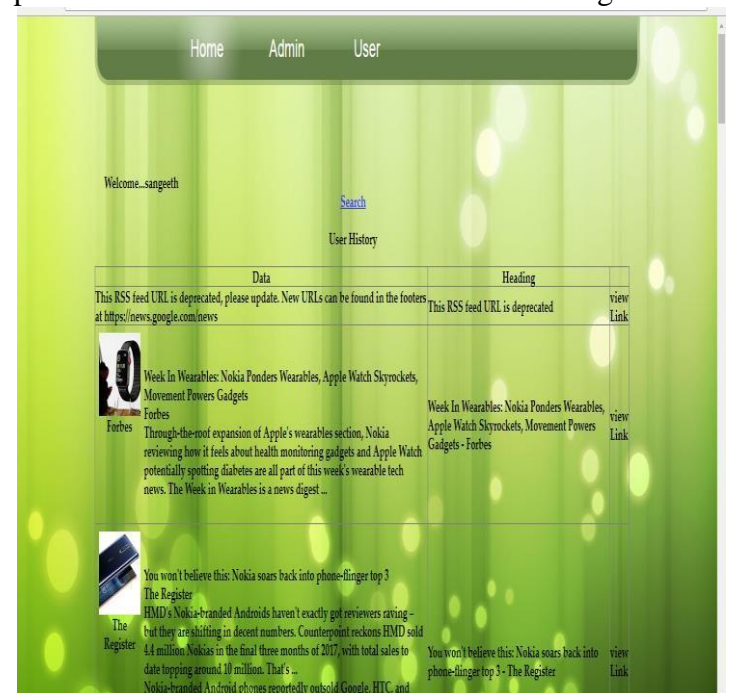
Fig 4: Search Results

We can evaluate the performance using accuracy metrics. The accuracy metric is evaluated as

$$Accuracy = \frac{TP+TN}{TP+TN+FP+FN} * 100$$

Fig 3: Proposed framework

The proposed algorithm provide improved accuracy rate than the machine learningalgorithms.

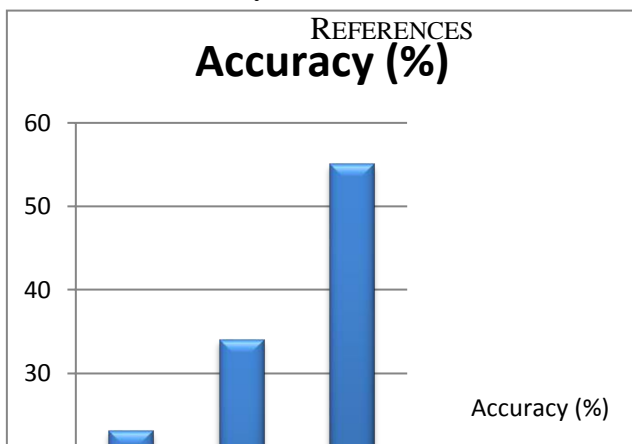| Algorithm	True positive	True negative	False positive	False negative
K-means	5	10	20	30
Page rank	10	8	15	20
Greedy algorithm	20	5	10	10

Table (1) Performance

measurementAccuracy table

Algorithm	Accuracy (%)
K-means	23
Page rank	34
Greedy algorithm	55

wn in table 2.

Table (2) Accuracy table

Fig 5: Performance chart

From the performance chart, Greedy algorithm provide high level accuracy than the existing machine learning algorithms

VI. CONCLUSION

Personalized web search customizes the quest consequences to enhance the search first- rate for net customers. However, user's private information is probably uncovered within the consumer profile that's the premise in personalized net search. In this challenge, proposed a grouping approach for anonymizing person profiles with likability notion to bound the possibility of linking a doubtlessly touchy term to a consumer by way of p. We offered a greedy clustering technique with novel semantic similarity metric based on augmented consumer profiles in an effort to deal with the sparsity of user profiles and consider semantic relationships between person profiles. Personalized search is a promising manner to improve seeks high-quality. However, this technique calls for customers to furnish the server full access to non-public facts on Internet, which violates customers' privacy. In this work, we investigated the feasibility of reaching stability among users' privateness and search excellent. First, a set of rules is provided to the person for gathering, summarizing, and organizing their personal facts right into a hierarchical user profile, wherein widespread phrases are ranked to better stages than precise phrases.P. Yin and Y. Guo, "Optimization of multi-criteria website structure based on enhanced tabu search and web usage mining," Applied Mathematics and Computation, vol. 219, no. 24, pp. 11082-11095, 2013.

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