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Chapter-1

Object Identification and Captioning Using Machine Learning and Deep Learning Techniques (LSTM)

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Abstract- *Deep learning and Machine learning are the most progressive technologies in this era. Artificial intelligence is now compared with the human mind and in some field AI doing a great job than humans. Automatically describing the content of images using natural languages is a fundamental and challenging task. The framework consists of a convolutional neural network (CNN) followed by a recurrent neural network (RNN). The research paper makes use of the functionalities of Deep Learning and NLP (Natural Language Processing). Image Caption Generation is an important task as it allows us automate the task of generating captions for any image. This functionality enables us to easily organize files without paying heed to the task of captioning. It also presents the implementation of LSTM Method with additional features for a good performance. Gated Recurrent Unit Method and LSTM Method are evaluated in this paper. According to the evaluation using BLEU Metrics LSTM is identified as the best method with 80% efficiency. This approach improves on the best results on the Visual Genome paragraph captioning dataset. Compared to existing approaches the proposed one shown good accuracy and efficient by means of time and quality.*

Keywords: NLP, RNN, LSTM, CNN

1. Introduction

Day by day there is new research in this field. This field is increasing very fast because now we have sufficient computational power for doing this task. Deep learning is a branch of machine learning that uses neural networks with many layers. In traditional machine learning, the algorithm is given a set of relevant features to analyze. However, in deep learning, the algorithm is given raw data and decides for itself what features are relevant. Deep learning networks will often improve as you increase the amount of data being used to train them.

Image captioning models typically follow an encoder-decoder architecture which uses abstract image feature vectors as input to the encoder and generate caption. Generating a natural language description from images is an important problem at the section of computer vision, natural language processing, artificial intelligence and image processing. Image caption, automatically generating natural language descriptions according to the content observed in an image, is an important part of scene understanding, which combines the knowledge of computer vision and natural language processing.

The application of image caption is extensive and significant, for example, the realization of human-computer interaction. This summarizes the related methods and focuses on the attention mechanism, which plays an important role in computer vision and is recently widely used in image caption generation tasks. Furthermore, this project model highlights some open challenges in the image caption task.
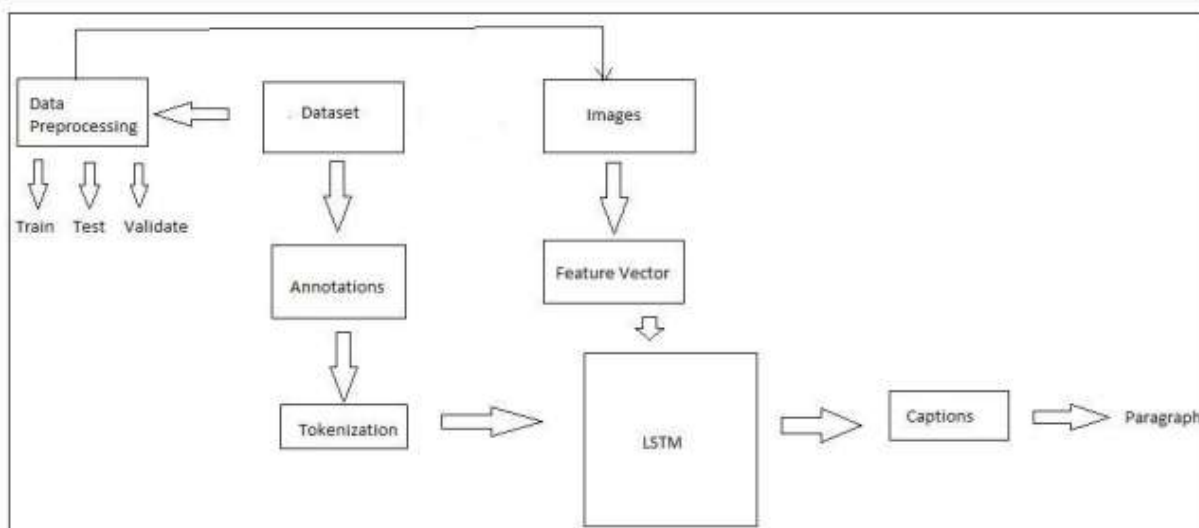
Fig.1: Step by Step Process

Image Caption Generation is based on the functionalities of CNN and RNN. Use of Keras Library has been made and the development has been done in Jupyter Notebook. The implementation for this paper has been done using Python Language. This paper is going to make use of COCO dataset. COCO (Common Objects and Contexts) data set is a specialized dataset which contains 1 lakh images with each containing 5 captions associated with each. This is one of the apt dataset for our model and allows to develop a well-trained model after rigorous training. CNN is majorly used to extract objects and other spatial information patterns from our input image whereas RNN works efficiently with any kind of sequential data fed to it. CNN is often called the encoder whereas RNN is associated with the decoder. Natural Language Processing is also being used here to generate image captions alongside CNN. LSTM are the specialized Recurrent Neural Networks which allow for information to persist. Use of the VGG16 model which is pre – trained on the ImageNet dataset for the classification of images has been made.

2. Survey

Pranay Mathur, Aman Gill, Aayush Yadav, Anurag Mishra, Nand Kumar Bansode Camera2Caption: A real-time image caption generator (2017) International Conference on Computational Intelligence in Data Science (ICCIDS) Proposed Deep Learning Based Advanced Technique Deep Reinforcement Learning that's led by Computer Vision and machines translation based on deep learning model. Dataset used in this model is MS-COCO. The proposed model based on deep learning, well optimize and perform in real time environment (mobile devices) and produce high quality captions by using help of tensorFlow by google.

R. Subash, Automatic Image Captioning Using Convolution Neural Networks and LSTM November 2019, Journal of Physics Conference,Series 1362:012096

Proposed Deep Learning based Convolution Neural Networks and Natural Language Processing (NLP) Techniques reasonable sentences are framed and inscriptions are produced.dataset used in this model is MS-COCO. Proposed model having convolution neural network whose output is paired to Long Short Term Memory network which helps us generate descriptive captions for the image. Also model don't require huge dataset to produce caption of images.

Simao Herdade, Armin Kappeler, Kofi Boakye, Joao Soares Image Captioning: Transforming Objects into Words. June 2019 33rd Conference on Neural Information Processing Systems (NeurIPS 2019), Vancouver, Canada.

Proposed Object Relation Transformer model, focuses on spatial relationship between objects of images through used of faster R-CNN with ResNet-101. Mainly focuses on Improve the relationship between objects.

Dataset used in this model is MS-COCO with Pycharm IDE.

The proposed model encodes positions and size and relationship between detected objects in images and extracted features by building upon the bottom-up and topdown image captioning approach and CNN.

B.Krishnakumar,K.Kousalya, S.Gokul,R.Karthikeyan, D.Kaviyarasu Image Caption Generator Using Deep Learning (IJAST)Vol.29 NO.3s(2020). Proposed Deep Learning based Convolution Neural Networks to identify objects in the images using OpenCv. Detected Images converted into audio using GTTP and then converted to text using to Long Short Term Memory network.They used Pre-trained model VGG16 as a baseline model.

Proposed Model successfully trained to generate captions of images using CNN technique, model is depends on data and used small data set.The model generate caption by using Keras Framework used in Jupyter notebook and also conclude keras has strong support for multiple GPU's.

Seung-Ho Han, Ho-Jin Choi Domain-Specific Image Caption Generator with Semantic Ontology

(2020) IEEE International Conference on Big Data and Smart Computing (BigComp) Proposed model uses domain specific image caption generator to overcome the limitation of open dataset MSCOCO which include general images. Firstly model uses objects and attribute information of images and then reconstruct generated caption using Semantic Ontology. dataset used in model is MS-COCO.

The Proposed model provides natural language description for given specific-domain. Model generates captions of images using visual and semantic attention.

Replacing specific words in captions with domain-specific words. For eg The general word "MENS" replace with "WORKERS" in image of "GROUP OF PEOPLE/MENS WEARING HELMETS AND STANDS IN A ROADS".

Machine Learning is an idea to learn from examples and experience, without being explicitly programmed. Instead of writing code, you feed data to the generic algorithm, and it builds logic based on the data given. Machine Learning is a field which is raised out of Artificial Intelligence(AI). Applying AI, we wanted to build better and intelligent machines. But except for few mere tasks such as finding the shortest path between point A and B, we were unable to program more complex and constantly evolving challenges. There was a realization that the only way to be able to achieve this task was to let machine learn from itself. This sounds similar to a child learning from its self. So machine learning was developed as a new capability for computers. And now machine learning is present in so many segments of technology, that didn't even realize it while using it[11].

3. Proposed work

3.1 Image Captions Generator

Image Caption Generator or Photo Descriptions is one of the Applications of Deep Learning. In which we have to pass the image to the model and the model does some processing and generating captions or descriptions as per its training. This prediction is sometimes not that much accurate and generates some meaningless sentences. We need very high computational power

and a very huge dataset for better results. Now we will see some information about the dataset and the architecture of the neural network of the Image captions generator.

CNN is a subfield of Deep learning and specialized deep neural networks used for the recognition and classification of images. It is used to process the data represented as a 2D matrix like images. It can deal with scaled, translated, and rotated imagery. It analyzes the visual imagery by scanning them from left to right and top to bottom and extracting relevant features from that. Finally, it combines all the features for image classification.

Being a type of RNN (recurrent neural network), LSTM (Long short-term memory) is capable of working with sequence prediction problems. It is mostly used for the next word prediction purposes, as in Google search our system is showing the next word based on the previous text. Throughout the processing of inputs, LSTM is used to carry out the relevant information and to discard non-relevant information. Image Caption Generator Model (CNN-RNN model)
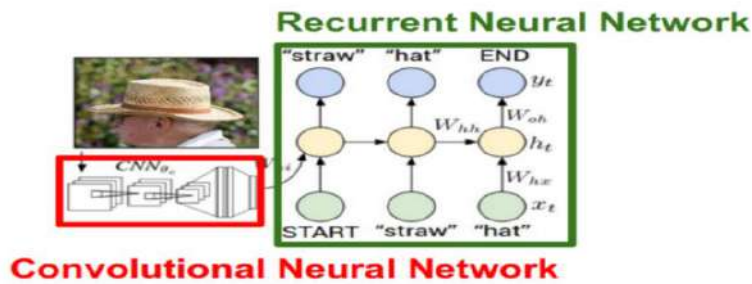

Fig.2: CNN and RNN

- CNN- To extract features from the image. A pre-trained model called Xception is used for this.
- LSTM- To generate a description from the extracted information of the image.

3.2 Image Features Detection
For image detecting, we are using a pre-trained model which is VGG16. VGG16 is already installed in the Keras library.VGG 16 was proposed by Karen Simonyan and Andrew Zisserman of the Visual Geometry Group Lab of Oxford University in 2014 in the paper <u>Very Deep Convolutional Networks for Large-Scale Image Recognition.</u>

Fig.3: Features Detection
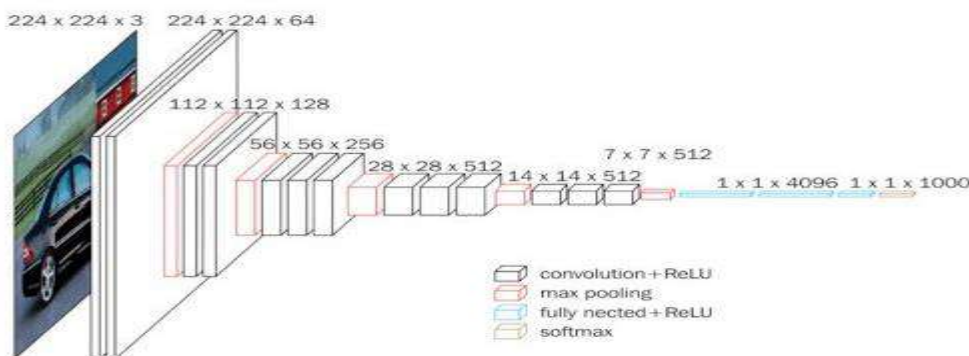
The input to conv1 layer is of fixed size 224 x 224 RGB image. The image is passed through a stack of convolutional (conv.) layers, where the filters were used with a very small receptive field: 3×3 (which is the smallest size to capture the notion of left/right, up/down, center). In one of the configurations, it also utilizes 1×1 convolution filters, which can be seen as a linear

transformation of the input channels (followed by non-linearity). The convolution stride is fixed to 1 pixel; the spatial padding of conv. layer input is such that the spatial resolution is preserved after convolution, i.e. the padding is 1-pixel for 3×3 conv. layers. Spatial pooling is carried out by five max-pooling layers, which follow some of the conv. layers (not all the conv. layers are followed by max-pooling). Max-pooling is performed over a 2×2 pixel window, with stride 2. Three Fully-Connected (FC) layers follow a stack of convolutional layers (which has a different depth in different architectures): the first two have 4096 channels each, the third performs 1000-way ILSVRC classification and thus contains 1000 channels (one for each class). The final layer is the soft-max layer. The configuration of the fully connected layers is the same in all networks

3.3 Text Generation using LSTM

Long Short Term Memory networks — usually just called "LSTMs" — are a special kind of RNN, capable of learning long-term dependencies. They were introduced by Hochreiter & Schmidhuber (1997) and were refined and popularized by many people in the following work. They work tremendously well on a large variety of problems and are now widely used.
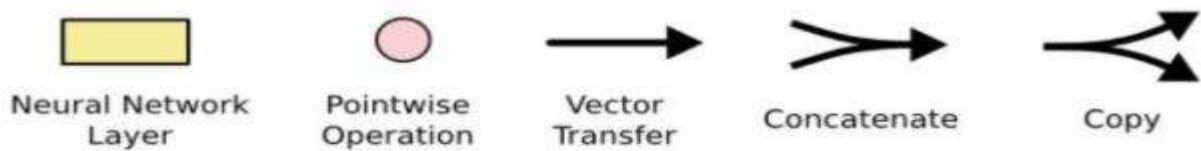
Fig.4: Text Generation Process

LSTM networks are well-suited to classifying, processing, and making predictions based on time series data since there can be lags of unknown duration between important events in a time series. LSTMs were developed to deal with the vanishing gradient problem that can be encountered when training traditional RNNs. Relative insensitivity to gap length is an advantage of LSTM over RNNs, hidden Markov models, and other sequence learning methods in numerous applications.

The advantage of an LSTM cell compared to a common recurrent unit is its cell memory unit. The cell vector has the ability to encapsulate the notion of forgetting part of its previously-stored memory, as well as to add part of the new information. To illustrate this, one has to inspect the equations of the cell and the way it processes sequences under the hood.

Fig.5: LSTM model

This final model is a combination of CNN and RNN models. To train this model we have to give two inputs two the models. (1) Images (2) Corresponding Captions. For each LSTM layer, we inpu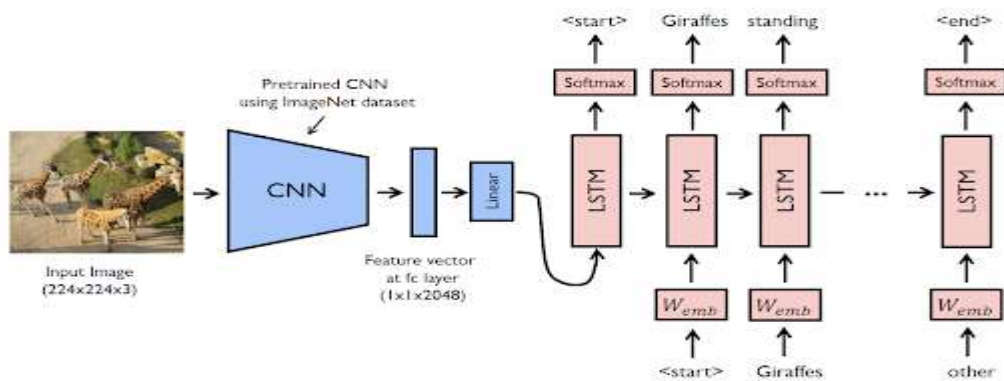t one word for each LSTM layer, and each LSTM layer predicts the next word, and that how the LSTM model optimizes itself by learning from captions. For Image features, we are getting All image features array from the VGG16 pre-trained model and saved in a file so that we can use this file or features directly to correlate captions and image features with each other. Finally the image features and LSTM last layer we input this both outputs combination into decoder model in which we are adding both image features and captions so that model learns to generate captions from images and for a final layer we generate output or captions which length is the maximum length of dataset captions.

The last layer has a size of the length of the vocab. For this model, we are using 'categorical cross-entropy ' because in the last layer we have to predict each word probability and then we are only using high probability words. We are using Adam optimizer for optimization of the network or update the weights of the network.

4. Results and Discussion

DATASET:

In this blog we are using the Flickr8k_dataset. The dataset contains two directories:

- **Flickr8k_Dataset:** Contains 8092 photographs in JPEG format.
- **Flickr8k_text:** Contains a number of files containing different sources of descriptions for the photographs. Flickr_8k_text folder contains file Flickr8k.token which is the main file of our dataset that contains image name and their respective captions separated by newline("\n").

The image dataset is divided into 6000 images for training, 1000 images for validation and 1000 images for testing.

Here, we will break down the module into following sections for better understanding:

- Preprocessing of Image
- Creating the vocabulary for the image
- Train the set
- Evaluating the model

Testing on individual images

```
A train traveling down tracks next to lights.
A blue and silver train next to train station and trees.
A blue train is next to a sidewalk on the rails.
A passenger train pulls into a train station.
A train coming down the tracks arriving at a station.

generated caption (CIDEr score 1.0)
train traveling down a track in front of a road
```


SENTENCES	BLEU	CIDER	ROUGE	METEOR
S₁	0.579	0.600	0.396	0.195
S₂	0.404	0.658	0.274	0.256
S₃	0.279	0.599	0.400	0.172
S₄	0.191	0.677	0.450	0.137

Metrics	LSTM Model	GRU	RNN
BLEU	0.579	0.473	0.525
CIDER	0.600	0.598	0.600
ROUGE	0.396	0.333	0.354
METEOR	0.195	0.188	0.190

5. Conclusion

This paper mainly focuses on paragraph captioning based on research papers. Different Captioning metrics are used for evaluation of the sentences generated by the system. The scores tells about the accuracy of the words obtained. Different methods are compared which tells the efficiency of the LSTM method to be 80%.This provides best results on Visual Genome Dataset. The output generated can have few limitations i.e,the paragraph can contain upto 500 words or 4-5 lines. Hence, this paper provides a clear view of how a paragraph is generated from an image. The scope of the paper is limited to LSTM and RNN approach. Compared to existing approaches the proposed one shown good accuracy and efficient by means of time and quality.

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Chapter-2

LSVM: a ML Based Algorithms for Prediction of Chronic Kidney Infections

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ABSTRACT: Constant Kidney Disease is one of the most basic ailments these days and appropriate determination is expected at the earliest opportunity. AI strategy has become solid for clinical treatment. With the assistance of an AI classifier calculations, the specialist can distinguish the infection on schedule. For this point of view, Chronic Kidney Disease expectation has been examined in this article. Ongoing Kidney Disease dataset has been taken from the UCI storehouse. Seven classifier calculations have been applied in this examination, for example, fake neural organization, C5.0, Chi-square Automatic communication finder, strategic relapse, direct help vector machine with punishment L1 and with punishment L2 and arbitrary tree. The significant component determination strategy was additionally applied to the dataset. For every classifier, the outcomes have been registered in light of (I) full highlights, (ii) relationship based include choice, (iii) Wrapper strategy highlight determination, (iv) Least outright shrinkage and choice administrator relapse, (v) manufactured minority over-examining procedure with least outright shrinkage and choice administrator relapse chosen highlights, (vi) engineered minority over-testing method with full elements. From the outcomes, it is denoted that LSVM with punishment L2 is giving the most noteworthy precision of 98.86% in engineered minority over-testing method with full elements. Alongside AI models one profound neural organization has been applied on the equivalent dataset and it has been noticed that profound neural organization accomplished the most noteworthy exactness of 99.6%.

1. INTRODUCTION

Persistent kidney Disease implies your kidneys are dam-matured and not separating your blood the manner in which it ought to. The essential job of kidneys is to channel additional water and waste from your blood to deliver pee and assuming the individual has experienced CKD, it implies that squanders are gathered in the body. This sickness is persistent on account of the harm slowly over an extensive stretch. It is complimenting a generally expected illness overall [1]. Because of CKD might experience some wellbeing difficulties. There are many reasons for CKD like diabetes, hypertension, coronary illness. Alongside these basic sicknesses, CKD additionally relies upon age and orientation [2]. On the off chance that your kidney isn't working, then, at that point, you might see at least one manifestations like stomach torment, back torment, the runs, fever, nosebleeds, rash, regurgitating. There are two principle illnesses of CKD: (I) diabetes and (ii) hypertension [3]. So that controlling of these two sicknesses is the counteraction of CKD. As a rule, CKD doesn't offer any diagnose till kidney is harmed seriously. CKD is being expanded quickly according to the examinations hospitalization cases increment 6.23 percent each year yet the worldwide death rate stays fixed [4]. There are not many analytic tests to actually look at the state of CKD:

(I) assessed glomerular filtration rate(eGFR) (ii) pee test (iii) circulatory strain.

2. RELATED WORK

Almasoud and Ward worked with CKD dataset of 400 occasions and 25 credits. They applied the channel highlight choice strategy on traits and observed that hemoglobin, egg whites and

explicit gravity are including ascribes in CKD dataset. After include choice, they prepared the dataset and approved with 10-overlay cross-approval. The slope supporting calculation accomplished the most noteworthy precision of 99.1%.

Shankar et al. applied three stages on a similar UCI dataset: (I) information preprocessing and highlight choice (ii), algorithms' precision assurance and (iii) diet plan idea. In the element determination strategy, they applied two methodologies: one is the Wrapper and the other is the LASSO technique. After the element determination technique, 4 characterization calculations were applied: Logistic Regression, Random timberland tree K-Nearest Neighbors, Neural Network and Wide and Deep Learning. For diet plan idea blood potassium level was utilized. The blood potassium level was separated into three gatherings in view of its worth: Safe Zone, Caution Zone and Danger zone.

Vijayarani and Dhayanand gathered kidney work test (KFT) dataset from clinical labs, research focuses and clinics. The dataset contained 584 cases and 6 credits and two classifier applied calculations: support vector machine (SVM) and fake neural organization (ANN). It was observed that ANN accomplished the most elevated precision of 87.7%.

Xiao et al. utilized the information of 551 patients and applied 9 AI calculation: XGBoost, strategic relapse, rope relapse, support vector machine, arbitrary woodland, edge relapse, neural organization, Elastic Net and K-closest neighbor. They assessed exactness, ROC bend, accuracy and review and observed that straight model gave the most elevated precision. Reshma et al. utilized the component choice strategy on CKD Dataset. For include choice, ACO technique was applied. ACO is the meta heuristic calculation for the element determination. It is the sort of Wrapper strategy. In their dataset, complete 24 credits were accessible. In the wake of applying highlight determination calculation, 12 elements was utilized for making the model. The Support Vector machine classifiers calculation was utilized for building the model.

In this perception, seven different machine learning classifiers were applied on the dataset. All the algorithms were running with both full features and selected features.

3. METHODS AND MATERIALS

In this segment, the examination system and a dataset will be talked about.

A. DATASET

Constant Kidney Disease dataset is utilized for this examination work. Numerous specialists had additionally utilized this dataset. This dataset is being given by the UC Irvine Machine Learning Repository and it is accessible on the UCI site. This dataset contains 400 occasions and 24 credits with 1 objective trait. The objective characteristic has named in two-class to address CKD or non-CKD. The dataset was gathered from different medical clinics in 2015. It contains additionally missing worth. The depiction of every one of the 24 ascribes is addressed in the table 1 beneath.

B. METHODOLOGY

In this exploration, we have fostered a model to foresee CKD infection in patients. The presentation of the model was tried on both all credits and chosen highlights. Among highlight choice techniques there were Wrapper, Filter and Embedded permitting to choose imperative highlights. Classifier calculations execution was tried on the chose highlights. IBM SPSS device is utilized for setting up the model. The AI classifiers like fake neural organization (ANN), C5.0, calculated relapse, straight help vector machine (LSVM), K-closest neighbors

(KNN) and irregular tree were utilized for preparing the model. Every classifier approval and perfor-mance lattice were processed. The methodology of this examination including five phases: (I) dataset preprocessing, (ii) highlight choice, (iii) classifier application, (iv) SMOTE and (v) ana-lyzing the exhibition of the classifier. Alongside AI models, a profound neural organization was applied for com-paring the consequence of AI models and profound neural organization. Fake Neural organization classifier was utilized for this reason. In this examination the meaning of two model were checked by measurement testing in particular McNemar's test.

C. PREPROCESSING OF DATA

Information preprocessing could be a system that is used to change over the crude data into a clean dataset. It is a

the essential advance to prepare each AI classifier calculation. This strategy finishes up such activities as handle missing qualities, rescaling of the dataset, change into paired information and normalize of the dataset. When the dataset included credits with fluctuating scales, rescaling is utilized to scale the dataset. The parallel change has been applied to con-vert the worth into 0 and 1. All upsides of each property are considered as 1 for over the limit and as 0 for underneath the edge. Normalized technique guarantees that each property has mean 0 and standard deviation 1.

D. FEATURE SELECTION

Highlight determination is required for prepared each AI classifier in light of the fact that without eliminating pointless traits from the dataset result might be impacted. The classifier algo-rithm with highlight determination gives better execution and lessen the execution season of the model. For this interaction, three different component choice techniques were utilized in this exploration.

E. CLASSIFICATION ALGORITHMS

Arrangement method is a significant component of regulated learning. Classifiers gain from the preparation dataset and apply on the testing dataset for observing the objective property. Beneath there are characterization strategies utilized in research.

F. LINEAR SUPPORT VECTOR MACHINE (LSVM)

This is the advanced particularly quick AI calculation for tackling multiclass grouping issue for the enormous dataset in light of a basic iterative methodology. It is made the SVM model in straight CPU season of the dataset. LSVM can be utilized for the high layered dataset is the inadequate and thick organization. It is utilized for addressing the huge dataset AI issues in more affordable registering asset. Support Vector Machine is a directed classifier calculation. It is utilized bit stunt for taking care of the characterization issue. In view of these transformations, ideal edge is found between the potential results. SVM is utilized for the nonlinear bit, like RBF. For the straight part, LSVM is a proper decision. LSVM classifier is adequate for all straight issues.

4. EXPERIMENTAL RESULT

In this subsection, the significant elements were chosen by CFS calculation to pass in the classifier calculations for foresee ing the results. Six most significant elements were utilized for finding the results, for example, bp, pc, pe, ane, pcv and rbc. According to the CFS calculation, bp and pc are the main variables for foreseeing Chronic Kidney Disease. The

consequence of CFS calculation is displayed in figure 5. The exhibition of each of the seven classifiers was depicted in table 5. The LSVM with Penalty L2 and Lambda 0.5 accomplished the most elevated exactness for chose highlights from the CFS calculation with 95.12% exactness, 93.34% accuracy and 93.34% review. C5.0 and CHAID accomplished an exactness of 92.68%. The C5.0 calculation accomplished 85.71% accuracy and 96% review. The CHAID calculation accomplished 92.68% exactness, 96.87% accuracy and 83% review. The ANN calculation accomplished 91.71% exactness, 89.19% accuracy and 88% review. The strategic relapse calculation accomplished the most reduced exactness of 51.22%, 96.87% accuracy and 92.54% review.

The LSVM with Penalty L1 and Lambda 0.5 accomplished 93.66% exactness, 87.8% accuracy and 96% review. The KNN accomplished for this dataset with a K worth of 5 exactness of 53.17%, accuracy of 97.05% and review of 100 percent. The irregular tree calculation accomplished 87.80% accuracy,82.05% accuracy and 85% review. As from the outcome, LSVM with punishment L1 accomplished the most noteworthy AUC. The correlation of accuracy, review and exactness is portrayed in figure 5. The correlation of the GINI record is displayed The correlation of AUC is depicted.
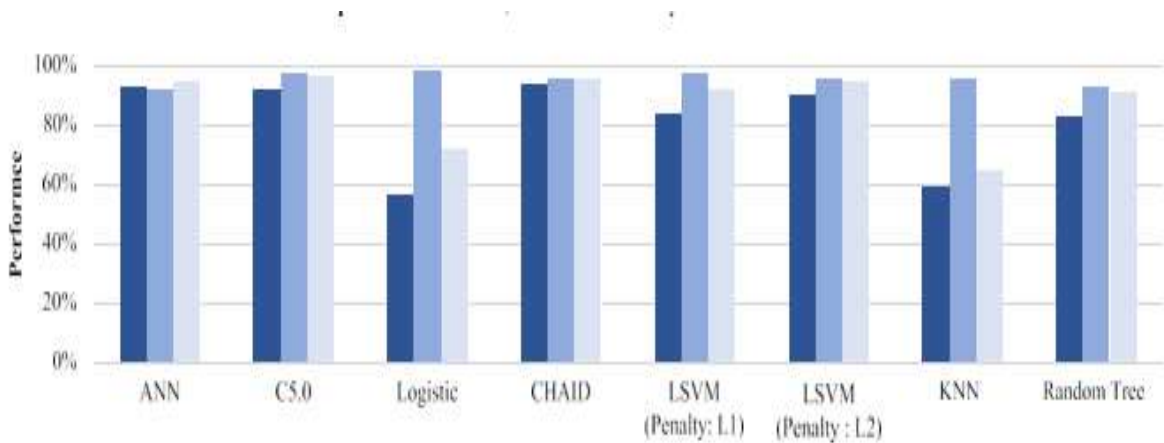

Fig-1: Comparison of Precision, Recall and Accuracy for various Classifiers
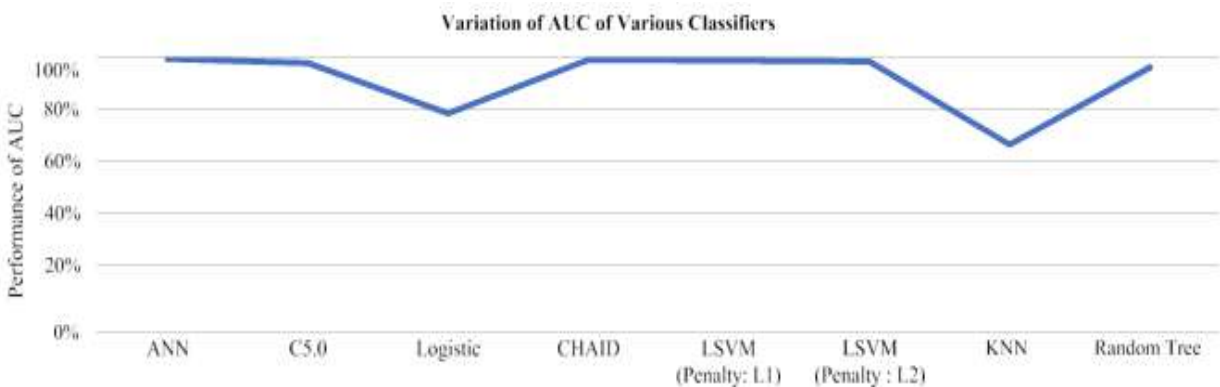

Fig-2: Comparison of Precision, Recall and Accuracy with feature selection

PERFORMANCE COMPARISON OF MACHINE LEARNING MODEL AND DEEP NEURAL NETWORK

All the AI model outcomes was examined and as indicated by it LSVM with punishment L2 performed best in SMOTE with full highlights and accomplished the most noteworthy precision of 98.46%. As examined, the profound neural organization accomplished the most noteworthy precision from among all models with 99.6%. To think about the exhibition of two models, McNemar's test was applied. For this test, the most elevated accu-shocking was accomplished by AI model, i.e., LSVM with SMOTE for all highlights and a profound neural organization was taken and their huge worth was noted. The p worth of this test was 0.29 and it is more prominent than critical level (α 0.05) and, consequently, we would dismiss theory.

5. CONCLUSION

This article objects to anticipate Chronic Kidney Disease in view of full highlights and significant elements of CKD dataset. For highlight determination three distinct procedures have been applied: relationship based include choice, Wrapper strategy and LASSO relapse. In this discernment, seven classifiers calculation were applied viz. fake neural organization, C5.0, calculated relapse, CHAID, straight help vector machine (LSVM), K-Nearest neighbors and arbitrary tree. For every classifier, the outcomes were processed in view of full fea-tures, chose highlights by CFS, chose highlights by Wrap-per, chose highlights by LASSO relapse, SMOTE with chose highlights by LASSO, SMOTE with full elements. It was seen that LSVM accomplished the most elevated precision of 98.86% in SMOTE with full highlights. LSVM accomplished the most elevated precision in all trials when contrasted with different classifiers calculations.

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Chapter-3

A Novel Network Based System Architecture in Machine Learning for Detection and Management of Intrusions

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Abstract-*Intrusion detection system (IDS) is one of the implemented solutions against harmful attacks. Furthermore, attackers always keep changing their tools and techniques. However, implementing an accepted IDS system is also a challenging task. In this paper, several experiments have been performed and evaluated to assess various machine learning classifiers based on KDD intrusion dataset. It succeeded to compute several performance metrics in order to evaluate the selected classifiers. The focus was on false negative and false positive performance metrics in order to enhance the detection rate of the intrusion detection system. The implemented experiments demonstrated that the decision table classifier achieved the lowest value of false negative while the random forest classifier has achieved the highest average accuracy rate. This paper researches machine learning and deep learning for intrusion detection in imbalanced network traffic. It proposes a novel Dynamic Difficult Set Sampling Technique (DDSSTE) algorithm to tackle the class imbalance problem. First, use the Edited Nearest Neighbor (ENN) algorithm to divide the imbalanced training set into the difficult set and the easy set. Next, use the KMeans algorithm to compress the majority samples in the difficult set to reduce the majority. We use classical classification models: random forest (RF), Support Vector Machine (SVM), Long and Short-term Memory (LSTM). The focus was on false negative and false positive performance metrics in order to enhance the detection rate of the intrusion detection system. The implemented experiments demonstrated that the decision table classifier achieved the lowest value of false negative while the random forest classifier has achieved the highest average accuracy rate.*

Keywords: DDSSTE, ENN, LSTM, RF

1. Introduction

With the rapid development of information technology in the past two decades. Computer networks are widely used by industry, business and various fields of the human life. Therefore, building reliable networks is a very important task for IT administrators. On the other hand, the rapid development of information technology produced several challenges to build reliable networks which are a very difficult task. There are many types of attacks threatening the availability, integrity and confidentiality of computer networks. The Denial of service attack (DOS) considered as one of the most common harmful attacks.

In general, there are two types of IDS (anomaly base or misuse base). Anomaly intrusion detection system implemented to detect attacks based on recorded normal behavior. Therefore, it compares the current real time traffics with previous recorded normal real time traffics; this type of intrusion detection system is widely used because it has the ability to detect the new type of intrusions. But from another perspective, it registers the largest values of false positive alarm, which means there are a large number of normal packets considered as attacks packets. However, misuse intrusion detection system is implemented to detect attacks based on repository of attacks signatures. It has no false alarm but at the same time, the new type of attack (new signature) can succeed to pass-through it.

In addition, the genetic algorithm was implemented to enhance detection of different types of intrusions. Meanwhile in [3] a methodology to detect different types of intrusions within the KDD is proposed. The proposed methodology aims to derive the maximum detection rate for intrusion types, at the same time achieved the minimum false positive rate. The GA algorithm used to generate a number of effective rules to detect intrusions. They succeeded to record 97% as accuracy rate based on this methodology. In some cases, if the single isolated machine learning algorithm used to handle all types of intrusions it would be derived by an unaccepted detection rate. In [11] the author used Naive Bayes algorithm to detect all intrusions types of KDD. He illustrated that the detection rate was not acceptable based on single machine learning algorithm.

Deep learning consists of various networks such as Convolutional Neural Networks (CNNs), Deep Belief Networks (DBNs), Restricted Boltzmann Machines (RBMs), and Recurrent Neural Networks (RNNs), each of which has different capabilities and properties. These networks can carry out the learning process in unsupervised, semi supervised or supervised manners [8]. Besides, they benefit from the hierarchical layers aimed to proper high-level features from the raw input data instead of using manual features, Recently, deep learning techniques are successfully applied in various domains such as text, audio, and visual processing as well as contexts such as sentiment analysis , social network analysis, recommender systems, natural language processing, wireless networking , and so on.
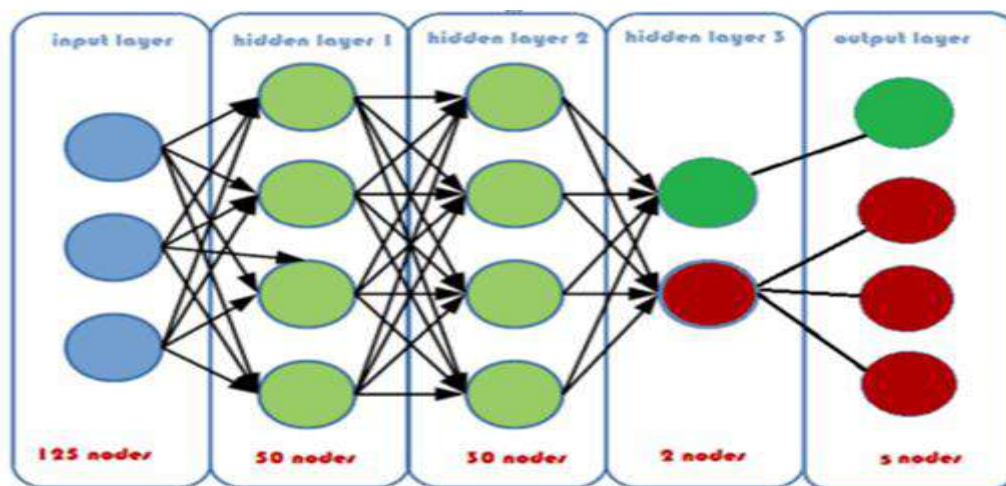

Fig .1: Deep learning based NN model

The widespread expansion of the computer networks and their new emerging applications has enabled the attackers to launch various security attacks against them by various means. In this context, in which most of them are browser attacks, brute force attacks, and Distributed Denial of Service (DDoS) attacks [1], [2]. Also, several security attacks for the new computing environments such as WBANs [3][5], e-healthcare systems [6][8], fog computing [9], Mobile Edge Computing (MEC), Cloud Computing [10], [11], wireless sensor networks [12], [13], mobile ad hoc networks [14][16], and Regarding the literature [5] attacks detection considered as classification problem because the target is to clarify whether the packet either normal or attack packet. Therefore, the model of accepted intrusion detection system can be implemented based on significant machine learning algorithms. In this paper, the following implemented the machine learning algorithms have been Implemented (J48, Random Forest, Random Tree, Decision Table, MLP, Naive Bayes, and Bayes Network) to evaluate and accurate the model of intrusion detection system based on a bench market dataset Knowledge Discovery in Databases (KDD) which includes the following types of attacks (DOS, R2L, U2R, and PROBE).

2. Related Work

For this purpose, this article focuses on deep learning based intrusion detection and provides a thorough survey of the different frameworks published in this context from 2010 up to 2020. However, to be more useful before presenting the survey, it first introduces the key terms and background knowledge about the IDS schemes and briey describes the leading deep learning techniques used in different steps of the intrusion detection process, such as feature selection/extraction and classification. To be more specific, this work classis the deep intrusion detection approaches based on the type of deep learning network applied in their various intrusions detection steps. It also illuminates their significant contributions and security services, which each scheme provides. Furthermore, it describes their main steps carried out using deep learning methods.

Besides, each section of the survey puts forward a comparison of the datasets, evaluation metrics, simulators, environments, and different feature extractions that have been applied in the analysis and variation of the proposed deep intrusion detection schemes. Such comparisons of the studied solutions can be biennial in highlighting plans for future works and illuminating the areas which have been less investigated. According to our studies, this is the first paper aimed to explore intrusion detection schemes that use deep learning networks.

Multi-layer Perceptron (MLP) Classifier: is one of the most common functions classifiers that prove its effectiveness to deal with several application areas e.g. time series, classification and regression problems. [15] The testing phase can be implemented within short period of time. On the other hand, the training phase is typically implemented in a long period of time. MLP algorithm can be implemented with various transfer functions e.g. Sigmoid, Linear and Hyperbolic. The number of outputs or expected classes and number of hidden layers are important design considerations of the MLP algorithm implementations. At the beginning, every node within the neural network had its randomly weight and bias values, the large weight values present the most effective attributes within a dataset, and on the contrary, the small weight values present the lowest effective attributes within a dataset.

Random Tree Classifier: is one of tree classifiers using this classifying the number of trees should be fixed before implementing. Each individual tree represents a single decision tree. Each individual tree has randomly selected attributes from dataset. Therefore the random tree classifier could be considered as a finite group of decision trees. The procedure of predicting the entire dataset is to migrate several decision trees outputs and choose the winner expected class based on total numbers of votes [16].

Random Forest Classifier: is one of the classification trees algorithms, the main goal of this algorithm is to enhance trees classifiers based on the concept of the forest. Random forest classifiers produced by the referred research, had an accepted accuracy rate and can be implemented to handle noise values of dataset. There is no re-modification process during the classification step. To implement this algorithm the number of trees within the forest should be figured because each individual tree within a forest predicts the expected output and after that the voting technique used to select the expected output that have the largest votes number [16].

In current years, with the effective cap potential of computerized feature extraction, deep gaining knowledge of has made super achievements with inside the fields of Computer Vision(CV), Autonomous driving(AD), Natural Language Processing(NLP). Many students follow deep gaining knowledge of two intrusion detection for traffic _c classification, which has end up a warm spot of current studies. The technique of deep gaining knowledge of is to mine the potential traits of high-dimensional facts via a training version and remodel community traffic anomaly detection into classification problem [15]. Through a massive variety of sample facts training, adaptive gaining knowledge of among ordinary community

traffic and peculiar community traffic successfully enhances real-time intrusion processing. Torres et al. difficult first transformed community traffic characteristics into a sequence of characters after which used Recurrent Neural Network(RNN) to analyze their temporal traits, which had been in addition used to discover malicious community traffic.

Wang et al. [16] proposed a malicious software program traffic classification set of rules primarily based totally on Convolutional Neural Network(CNN). By mapping the traffic traits to pixels, the community traffic picture is generated, and the picture is used because the center of the CNN to recognize traffic classification. Staudemeyer and Shamsinejad [13] proposed an intrusion detection set of rules primarily based totally on Long Short-Term Memory (LSTM), which detects DoS assaults and probe assaults with particular time collection with inside the KDD Cup99 dataset. Kwon et al. has performed applicable studies at the deep gaining knowledge of version, specializing in facts simplification, dimension reduction, classification, and different technologies, and pro- poses a Fully Convolutional Network (FCN) version. By com- paring with the conventional gadget gaining knowledge of technology, it is proved that the FCN version is beneficial for community traffic analysis. Tama et al. proposed an anomaly-primarily based totally IDS primarily based totally on a two-degree Meta classifier.

3. Proposed Approach

Faced with imbalanced network traffic, we propose the Dynamic Difficult Set Sampling Technique (DSSTE) algorithm to compress the majority samples and augment the number of minority samples in difficult samples, reducing imbalance in the training set that the intrusion detection system can achieve better classication accuracy. We use Random Forest, SVM, STM, Mini-VGGNet, and AlexNet as classifiers for classication models.
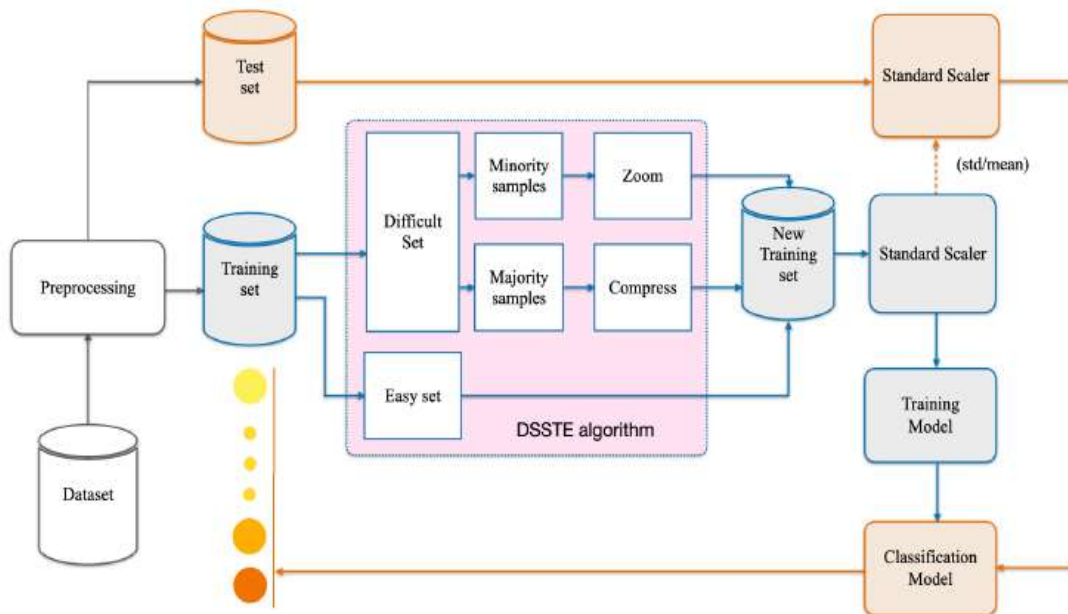

Fig.2: Proposed Architecture

3.1 LONG SHORT-TERM MEMORY

The Long Short-Term Memory(LSTM) network is a Recurrent Neural Network(RNN) structure proposed by Hochreiter and Jurgen in 1997. Like most RNN, the LSTM network is universal because as long as there is a suitable weight matrix, the LSTM network can calculate any

network element that can be calculated by any conventional computer. Different from the traditional RNN, the LSTM network is very suitable for learning from experience. When there is a time lag of unknown size and boundary between important events, the time series can be classified, processed, and predicted.

LSTM is not sensitive to gap length and has advantages over other RNN and hidden Markov models and other sequence learning methods in many applications. The problem of gradient disappearance and gradient explosion is solved by introducing the gate structure and storage unit.

We proposed the intrusion detection model shown in Figure 2. Data pre-processing first performed in our intrusion detection structure, including duplicate, outlier, and missing value processing. Then, partitioning the test set and the training set, and the training set processed for data balancing using our proposed DSSTE algorithm. Before modeling, to increase the speed of the convergence, we use Standard Scalar to standardize the data and digitize the sample tables. Finally, the processed training set is used to train the classication model, and then the model is evaluated by the test set.

Algorithm 1 DSSTE Algorithm

Input: Imbalanced training set S, scaling factor K

Output: New training set S_N

1: **Step1: Distinguish easy set and difficult set**
2: Take all samples from S and set it as S_E
3: **for** each sample $\in S_E$ **do**
4:      Compute its K nearest neighbors
5:      Remove whose most K nearest neighbor samples are of different classes from S_E
6: **end for**
7: Easy set S_E, difficult set $S_D = S - S_E$
8: **Step2: Compress the majority samples in difficult set by the cluster centroid**
9: Take all the majority samples from S_D and set it as S_{Maj}
10:      Use KMeans algorithm with K cluster
11:      Use the coordinates of the K cluster centroids replace the majority samples in S_{Maj}
12: Compressed the majority samples set S_{Maj}
13: **Step3: Zoom augmentation**
14: Take the minority samples from S_D and set it as S_{Min}
15: Take the Discrete attributes from S_{Min} and set it as X_D
16: Take the Continuous attributes from S_{Min} and set it as X_C
17: Take the Label attributes from S_{Min} and set it as Y
18: **for** $n \in range(K, K + \frac{number}{S_{Min}.shape[0]})$ **do**   // zoom range is $[1 - \frac{1}{K}, 1 + \frac{1}{K}]$, $S_{Min}.shape[0]$ is number of samples in S_{Min}
19:      $X_{D1} = X_D$
20:      $X_{C1} = X_C \times (1 - \frac{1}{n})$
21:      $X_{D2} = X_D$
22:      $X_{C2} = X_C \times (1 + \frac{1}{n})$
23:      S_Z append $[concat(X_{D1}, X_{C1}, Y), concat(X_{D2}, X_{C2}, Y)]$
24: **end for**
25: New training set $S_N = S_E + S_{Maj} + S_{Min} + S_Z$

First, the imbalanced training set to divide into near-neighbor set and far-neighbor set by Edited Nearest Neighbor (ENN) algorithm. The samples in the near-neighbor set are highly similar, making it very difficult for the classier to learn the differences between the categories, so we refer to the samples in the near-neighbor set as difficult samples and the far-neighbor set as easy samples. Next, we zoom n and out the minority samples in difficult set. Finally, the easy set and minority in difficult set are combined with its augmentation samples to make up a new training set. We use the K neighbors in the ENN algorithm as the scaling factor of the entire algorithm. When scaling factor K increases, the number of difficult samples increases, and the compression rate of the majority of samples and the synthesis rate of the minority of class also increase.

4. Results

In this experiment, we use the classical classication algorithms of machine learning and deep learning, including Random Forest(RF), Support Vector Machine(SVM),Long Short-Term Memory(LSTM), AlexNet, and Mini-VGGNet. And compared with other sampling methods, including Random Under-sampling(RUS), Random Over-sampling(ROS).

4.1 DATA PREPROCESSING

When the dataset is extracted, part of the data contains some noisy data, duplicate values, missing values, infinity values, etc. due to extraction errors or input errors. Therefore, we first perform data preprocessing. The main work is as follows.
(1) Duplicate values: delete the sample's duplicate value, only keep one valid data.
(2) Outliers: in the sample data, the sample size of missing values(Not a Number, NaN) and Infinite values(Inf) is small, so we delete this.
(3) Features delete and transform: In CSE-CIC-IDS2018, we delete features such as ``Timestamp'', ``Destination
Address'', ``Source Address'', ``Source Port'', etc.

Machine Learning Classifiers	TP Rate	Precision
J48	0.931	0.989
Random forest	0.938	0.991
Random tree	0.906	0.992
Decision table	0.924	0.944
MLP	0.919	0.978
Naive Bayes	0.912	0.988
Bayes Network	0.907	0.992

	DDSTE	ROS	SMTE
ACCURACY	0.98	0.96	0.93
F1 SCORE	0.92	0.93	0.94
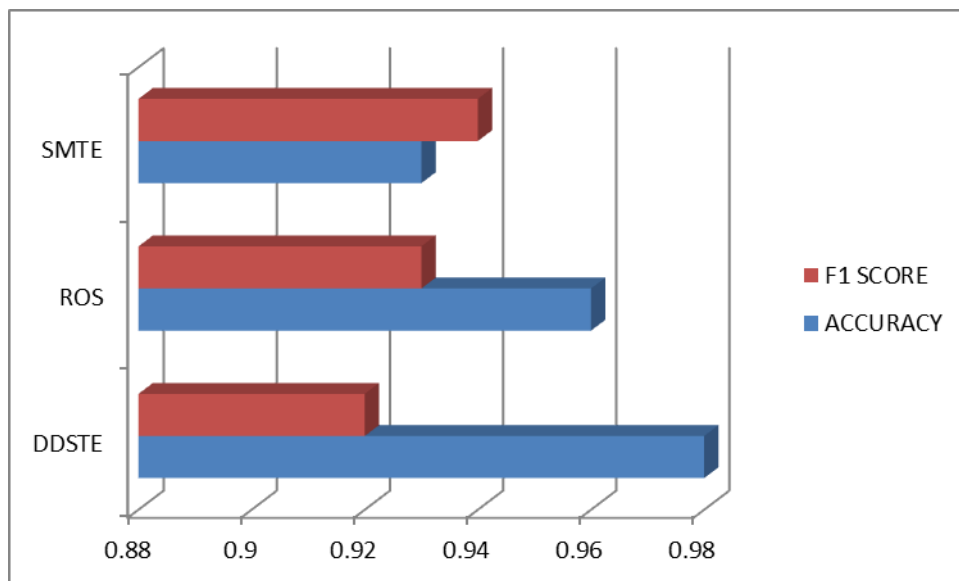
5. Conclusion

This paper proposed a novel Dynamic Difficult Set Sampling Technique (DDSSTE) algorithm, which enables the classification model to strengthen imbalanced network data learning. A targeted increase in the number of minority samples that need to be learned can reduce the imbalance of network traffic and strengthen the minority's learning under challenging samples to improve the classification accuracy. We used six classical classification methods in machine learning and deep learning and combined them with other sampling techniques. Experiments show that our method can accurately determine the samples that need to be expanded in the imbalanced network traffic and improve the attack recognition more effectively. In the experiment, we found that deep learning performance is better than machine learning after sampling the imbalanced training set samples through the DDSSTE algorithm. Although the neural networks strengthen data expression, the current public datasets have already extracted the data features in advance, which is more limited for deep learning to learn the preprocessed features and cannot take advantage of its automatic feature extraction. Therefore, in the next step, we plan to directly use the deep learning model for feature extraction and model training on the original network traffic data, performance the advantages of deep learning in feature extraction, reduce the impact of imbalanced data and achieve more accurate classification.

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Chapter -4

A Deep Study on IOT based Security System for Data Storage in Cloud

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ABSTRACT: IoT related applications have created as an important field for the two fashioners and trained professionals, reflecting the significance also impact of data related issues to be unwound in contemporary business affiliations especially in cloud computing. This paper at first gives a helpful design that recognizes the getting, the leaders, planning and mining districts of IoT immense data, and a not many related particular modules are described and depicted similar to their critical characteristics and limits. By then rhythmic movement look into in IoT application is analyzed, likewise, the challenges and openings related with IoT tremendous data research are perceived. We also report an examination of essential IoT application creations and exploration focuses reliant upon related academic and industry appropriations. Finally, a few open issues and a few normal models are given under the proposed IoT related research structure.

Keywords: IoT, Cloud   Storage

1. INTRODUCTION

IoT applications get data from different conveyed sensors. These data types contrast from entire number to character, including semi-coordinated and unstructured data, for instance, pictures, sound and video transfers. Guidelines to fuse these disseminated data from multi-source is central for application improvement.

Colossal scale dynamic information: IoT applications in every case con-nect a gigantic amount of sensors. Correspondences between various articles in a huge scope dynamic climate create a huge volume of ongoing, fast, unin-terrupted information streams. Along these lines, versatile capacity, sifting and pressure plans are fundamental for proficient information handling in cloud stage.

Low-level with feeble semantics data: IoT data from sensors are of low-level with delicate semantics before they are taken care of. Relations of these data are transitory spatial association. With the ultimate objective of execution of these intelligent structures, complex semantics should be detached in event driven perspective from the mass of low-level data. Some examinations exhibit that most sens-ing systems can simply get 1/3 right data achieved by touchy scrutinizing, which brings inconveniences into direct us-age. Thusly, multi-estimation data assessment and taking care of are huge for wide assignment of IoT applications.

IoT-based Data Storage Systems in disseminated figuring are face three arrangements of conflict essentials, which are conveyed execution with joined organization of establishment resources, multi-occupant accumulating with disengaged execution, and flexibility with versatile. Furthermore, by the use of Cloud stage for IoT data exchanging, planning and blend, different essentials are given for mass, progressing and unstructured data dealing with covering different aspects, for instance, data repre-sentation, data amassing and data examination.

Considering data dealing with limit, this paper at first gives a valuable construction that perceives the acquisition, man-agement, organizing and mining regions of IoT data. A couple of related pragmatic modules are described and portrayed similar to their critical characteristics and capacities. By then, mutt rent investigate in IoT applications is inspected to perceive the hardships related with related utilitarian regions. Considering research assessment, a few future specific inclinations are moreover proposed.

2. METHODS AND CHALLENGES

Data Acquisition and Integration Module: nformation securing and reconciliation module is intended to get information from various sorts of sensor gadgets, like RFID, ZigBee sensors, GPS gadgets, temperature sensors, and so on Heterogeneous information carries a major test to IoT applications when the designers need to incorporate huge organized, semi-organized, and unstructured information. According to the point of view of information handling in figuring, we can order the three primary strategies during the time spent information securing and coordination: information portrayal models, multi-source information combination, and information transmission and correspondence.

Data Representation Models: Data Representation mod-els are utilized for IoT information securing and reconciliation fundamen-count. There exist a few distinct kinds of sensor gadgets, like messages, occasions, pictures, recordings, status information, and so on Information portrayal models should be planned in light of various application purposes with an adaptable and normal arrangement.

Customary communicating strategy for the sensor information in favorable to prietary designs isn't enough for the IoT applications in light of the fact that various objects of inserted frameworks are different either in the language or setting level. Consequently, occasion information are expected to oversee in a brought together, coordinated and associated way in light of the fact that the occasion information depend on monstrous, various, and interre-lated information sources. Consequently, sensor information should be improved and changed into Resource Description Framework (RDF) design for additional handling. In [3], a system called HEP which incorporates the portrayal of social and XML occasion streams is proposed to help a bound together occasion combining and handling with an overall determination. The structure could be utilized to communicate practically a wide range of windows to see effectively and keep a decent adaptability. In [4], a relating Virtual Object (VO) model is proposed to enhance those sensors with setting data to help savvy city application in light of mental IoT objects. The model addresses genuine articles (sensors) for mass information remotely getting to, and produces a surge of crude sensor estimations. UI is becoming progressively significant with the improvement of the IoT applications. furthermore activation natives of brilliant gadgets, a model-based interface portrayal conspire [5] is proposed to create UI. The UI portrayal lan-guages can do instinctive connection points for designers to favorable to present scientific categorization of gadget regulator. In [6], the creators propose a way to deal with infer semantic comparability and relatedness on a distributional measurable model of semantics. A standard language and an occasion matcher is utilized to introduce an inexact model to separate the semantic coupling aspect for additional handling. This model has been approved accurately by huge arrangements of occasions from certifiable savvy city. On thought of amassed heterogeneous information streams, an Event Information Management stage [7] is proposed to gather and break down.

3. ARCHITECTURE

With the quick improvement of IoT application in cloud stage, number of associated gadgets has expanded in an exceptionally high velocity. It has been said that the gadgets are more than individuals on the Earth in 2011. What's more the associated gadgets are relied upon to arrive at 24 billion by 2020. This gadgets will associated through cloud stages for various applications. IoT and distributed computing working in joining makes another worldview, which have been named as Cloud of Things (CoT).
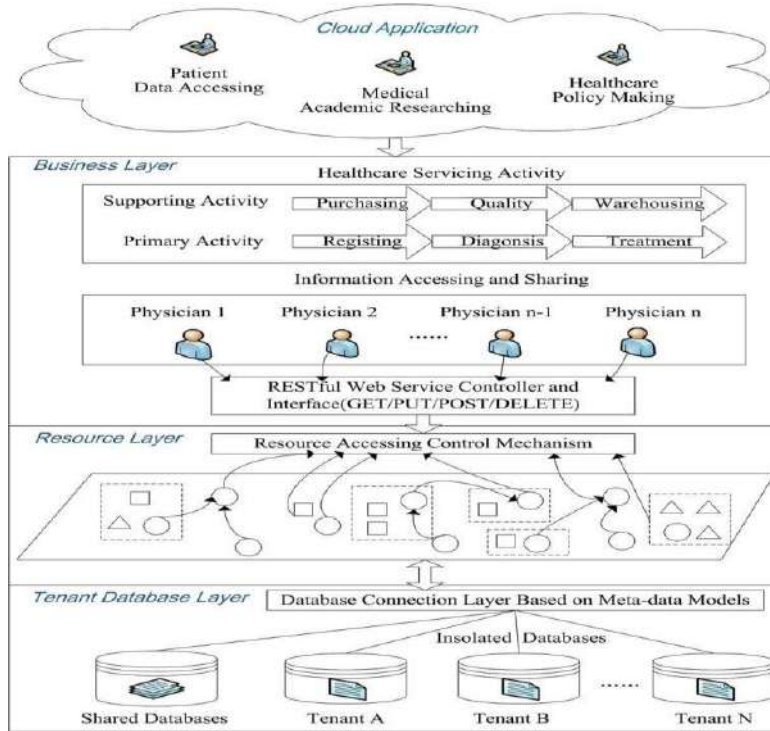

Fig-1: Security System Architecture

In Cloud of Things, IoT objects are stretched out from sensors to each front-end things in the Internet. Furthermore conveyed locales are associated in general body, like savvy house, shrewd industrial facility, brilliant city and shrewd planet. In view of CoT, an intelligent engineering of savvy city is given. With the converge of Cloud stage and Internet of Things, Cloud of things is expected to enhance the capacity for enormous gadgets intuitive and interoperability in order to help savvy and smart applications. The CoT will take increasingly more significant job in various businesses and exploration regions. A few issues, for example, Resource distribution adjusted energy and productivity, IPv6-based Identity the executives, Quality of Service provisioning, Architecture for information stockpiling, Security and protection and unnec-essary Communication of information will be engaged with CoT [2]. Furthermore founded on cosmology based multi-occupant information the board in cloud climate, an ordinary CoT stage is additionally given for IoT applications.

Unstructured information, for example, video information couldn't be put away into an organized data set framework for examination reason. Furthermore information mining on dataflow structure various information sources with non-endured affiliation is a new however significant issue. There are a few distinct bearings to process dataflow for certain unique techniques, for instance, to withdrew highlights from con-tinuous dataflow to construct information affiliation, or to handle the entire body of a piece of dataflow by work transfor-mation. Information Stream Processing in Dynamic and Decentralized Peer-to-Peer Network process information surges of various dynamic information sources. The methodology included

three areas of information source the executives, nonstop question conveyance and dispersed inquiry the board.

Information Stream mining included unsure thinking in view of segment information and utility of middle of the road result for high proficiency. At the point when unstructured and semi-organized information are additionally engaged with the handling system, there are loads of investigates and specialized issue left to do.

New design for equal and dynamic information handling In enormous IoT information climate, information are changing on types, state and examination reason. Other than brought together expert server executions, equal and molecule information handling system is need to empower the execution MapReduce design in unique cloud foundations. A methodology which involving the MapReduce system for enormous scope diagram information handling is given. The methodology depends on a thickness based apportioning to assemble adjusted parcels of a diagram data set over a bunch of machines. The analyses show that the presentation and adaptability are fulfilling for enormous size of information handling.

Scale highlights of the enormous information on different parts in many quickly changed sources produce hindrances to track down helpful data from these information. In this way, these re-construct and re-execution information mining calculation are not appropriate for enormous information investigation framework. We really want new powerful information mining calculations on the dataflow other than contended underlying information.

Notwithstanding, regardless of its apparent merits, for example, adaptability, adaptation to internal failure, simplicity of programming, and adaptability, MapReduce has restriction in intuitive or ongoing handling on han-dling IoT information handling. MapReduce isn't ideally suited for each enormous scope logical assignment, and the high correspondence cost and excess handling make a major test for IoT application. In a specialized structure for development MapReduce is given. In light of shortcoming and current settled strategies, we given a streamlining necessity on IoT information for a huge scope handling reason.

4. CONCLUSION

As the IoT innovations are advancing, a significant measure of their applications have been established in numerous enterprises. This paper is an opportune exploration which outlines the current and potential IoT huge information stockpiling frameworks in distributed computing and simultaneously reviews the condition of-workmanship in writing from the perspective on information handling process.

The IoT stockpiling framework empowers following of fundamental infor-mation about things as they travel through cloud stages. It shows critical incentive for IoT applications by giving an exact information on the current IoT information handling, which brings about higher accessibility and adaptable asset arrangement.

Information stockpiling framework supporting IoT gadgets can be used to further develop the whole information handling effectiveness and deal tremendous upper hand to the IoT applications. It has been shown that semantic connections among IoT information will prompt more prominent worldwide shrewd and between functional abilities (Contextual business scene, semantic comment, and multi-gadgets participation et al.). IoT Data stockpiling frameworks will empower undertaking to get such capacity.

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Chapter-5

An IoT based Authentication and Access Control Using Machine Learning: A Review

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ABSTRACT: *The future Internet of Things (IoT) will have a profound conservative, business and social effect on our lives. The taking an interest hub in IoT networks are generally asset compelled, which makes them drawing focuses for digital assaults. In such manner, broad endeavors have been made to address the security and protection issues in IoT networks basically through conventional cryptographic methodologies. In any case, the extraordinary roast acteristics of IoT hubs render the current arrangements inadequate to incorporate the whole security range of the IoT organizations. This is, basically partially, in view of the asset imperatives, heterogeneity, gigantic constant information produced by the IoT gadgets, and the broadly unique conduct of the organizations. In this manner, Machine Learning (ML) and Deep Learning (DL) methods, which can give implanted insight in the IoT gadgets and organizations, are utilized to adapt to various security issues. In this paper, we methodically audit the security necessities, assault vectors, and the current security answers for the IoT organizations. We then, at that point, shed light on the holes in these security arrangements that call for ML and DL draws near. We additionally examine exhaustively the current ML and DL answers for tending to various security issues in IoT organizations. Finally, in view of the definite examination of the current arrangements in the writing, we talk about the future exploration bearings for ML-and DL-based IoT security.*

Keywords: Authentication, Access Control, Machine Learning, IOT

1. INTRODUCTION

Information created by the IoT gadgets is enormous and along these lines, conventional information assortment, stockpiling, and handling strategies may not work at this scale. Moreover, the sheer measure of information can likewise be utilized for designs, practices, expectations, and evaluation. Also, the heterogeneity of the information produced by IoT makes one more front for the current information handling systems. In this way, to bridle the worth of the IoT-produced information, new components are required. In this unique circumstance, Machine Learning (ML) is viewed as perhaps the most appropriate computational worldview to give inserted insight in the IoT gadgets [18]. ML can help machines and brilliant gadgets to gather valuable information from the gadget or human-produced information. It can likewise be characterized as the capacity of a savvy gadget to change or robotize the circumstance or conduct in light of information which is considered as a fundamental part for an IoT arrangement. ML strategies have been utilized in assignments like characterization, relapse and thickness assessment. Variety of uses like PC vision, misrepresentation location, bio-informatics, malware discovery, validation, and discourse acknowledgment use ML calculations and procedures. Along these lines, ML can be utilized in IoT for offering canny types of assistance. In this paper, notwithstanding, we center around the utilizations of ML in giving security and protection administrations to the IoT organizations.

2. CHARACTERISTICS OF IOT NETWORKS:

Heterogeneity: In an IoT organization, a large number of various gadgets with various capacities, attributes and different correspondence conventions speak with one another. All the more unequivocally, the gadgets could involve various norms for com-munication, and different correspondence ideal models, (for example, cell or Ethernet) and variable limitations on the equipment assets.

Enormous scope organization: It is theorized that the billions of gadgets associated with one another and through Internet will probably outperform the capacities of the current Internet. The de-ployment of IoT for gigantic scope additionally brings difficulties. A portion of these difficulties incorporate plan of systems administration and capacity engineering for brilliant gadgets, proficient information correspondence conventions, proactive distinguishing proof and assurance of IoT from malevolent assaults, normalization of advancements, and gadgets and application interfaces and so on

Concerning network: IoT gadgets are relied upon to be associated to worldwide data and correspondence framework and can be gotten to from anyplace and whenever. The availability relies upon the kind of administration and application given by the IoT administration provider(s). At times, the availability could be neighborhood, (for example, if there should arise an occurrence of associated vehicle innovation or multitude of sensors) though in different cases it very well may be worldwide, for example, in the event of shrewd home access through portable foundation and basic framework the board.

Correspondence in nearness: Another striking element of IoT is the correspondence in nearness without including the focal specialists like base stations. Gadget to-Device correspondence (D2D) use the qualities of highlight point correspondence like Dedicated Short Range Communication (DSRC) and comparative advances. The design of customary Internet is more disposed towards network-driven correspondence while as of late the decou-pling of organizations and administrations empower gadget driven as well as satisfied driven correspondence which enhances the IoT administration range.

SECURITY CHALLENGES AND THREAT MODELS IN IOT:

Fundamentally, IoT utilizes an extraordinary way to deal with favorable to vide purchasers with various applications and administrations. The unavoidable sending of enormous number of gadgets additionally increment the assault surface. Then again, the way that IoT gadgets are (as a rule) asset obliged; in this way, it isn't possible to utilize complex security instruments against famous assaults. Besides, it is worth focusing on that the first Internet was not intended for IoT. Consequently, it is impera-tive to give IoT security on top of the current security components of the Internet and the basic advances. To this end, IoT utilizes different correspondence advances, for example, yet not restricted to, IPv6, Zigbee, 6LoWPAN, Blue-tooth, Z-Wave, WiFi, and Near Field Communications (NFC), to give some examples . These previously mentioned interchangesadvancements have their own weaknesses and limits from security point of view and these restrictions are acquired in the IoT space too. Notwithstanding these issues, the hidden TCP/IP based correspondence foundation is inclined to difficulties like adaptability, intricacy, tending to, arrangement, and deficient asset use that limit the potential outcomes of involving it for different and heterogeneous organizations, for example, IoT. To this end, different elective advancements, for example, data driven systems administration (ICN) and programming characterized organizing (SDN) have been used to fill in as hidden correspondence frameworks for IoT. Here, we give the rundown of the dangers and assaults looked by IoT. Without loss of over-simplification, security assaults in IoT can be dynamically partitioned into physical, network, transport, application, and encryption assaults.

Physical Attacks

In actual assaults, the aggressors have direct admittance to the gadgets and control various parts of the gadgets. To gain admittance to the actual gadgets, social designing is quite possibly the most unmistakable techniques where the aggressor access the gadgets and perform genuine assault that reaches from actual harm to the gadget to listening in, side-channels, and other related assaults. Notwithstanding the way that various advances are utilized at the actual layer for IoT, the idea of actual assaults generally look like and need social designing like methodologies. Besides, to send off actual assaults, the assailants should be in the closeness of the gadgets/equipment with various aims, for example, truly annihilating the equipment, restricting its lifetime, jeopardizing the correspondence component, altering the energy source, etc. It is likewise important that actual assaults perhaps venturing stone for different assaults, for example impairing a caution in a home could prompt a theft or other related harm in shrewd home climate. Likewise, a supplanting of sensor with a malignant sensor would prompt delicate information spillage. Infusion of malevolent hub into the organization can likewise cause man-in-the-center assault that empowers that aggressor to heighten honors and send off different assaults. Besides, such altering gadgets may likewise empower the aggressors to make changes in the directing tables and security keys that will influence the correspondence with upper layers . Other actual assaults remember sticking radio frequencies which denies the correspondence for IoT climate. Among numerous different repercussions, sticking causes disavowal of administration in IoT accordingly unfavorably influencing the usefulness of IoT applica-tions. As has been referenced, the aggressors likewise utilize different social designing ways to deal with have actual admittance to equipment/gadgets for various purposes, for example, the assaults we previously referenced. Through friendly designing, the assailants might control clients to acquire actual admittance to the gadgets.

Transport Layer Attacks

Transport layer is answerable for interaction to deal with conveyance where transport conventions empower the cycles to trade information. With regards to IoT, the conventional vehicle layer security gives actually persevere. The most genuine assault at this layer is the disavowal of administration assault that stifles the organization and results willfully ignorant of administrations to the applications. It is worth focusing on that because of the idea of IoT, customary TCP and UDP conventions don't scale with asset obliged gadgets, and hence lightweight forms of transport conventions have been proposed in the writing [52]-[54]. Be that as it may, the secu-rity of these conventions is of essential significance to mitigate the DoS and DDoS assaults in IoT.

3. AUTHENTICATION AND ACCESS CONTROL IN IOT

This is one of the essential security prerequisites in IoT. The clients should be validated to utilize IoT applications or potentially benefits. Commonly, IoT applications and administrations depend on information trade across various stages. The information recovered from the IoT gadgets is pre-handled, handled, and afterward went through a choice emotionally supportive network to check out of it. These cycles might differ contingent on the fundamental IoT engineering; be that as it may, information stream might be indistinguishable in these frameworks. Without loss of over-simplification, when an application or potentially a client needs a few information from an IoT gadget, the element (client or application) should be confirmed to IoT organization and it should be ensured that the requester has required admittance privileges for the information. Any other way, the solicitation to access such information will be denied. Like different organizations, access control is additionally of vital

significance in IoT organizations and similarly testing due to, yet not restricted to, network heterogeneity, volume of organization, asset requirements of the gadgets, organization (in)security, and assaults weaknesses, to give some examples.

Presently utilized verification factors incorporate the accompanying:

Information factor. The information element, or something you know, might be any confirmation qualifications that comprise of data that the client has, including an individual recognizable proof number (PIN), a username, a secret word or the response to a mystery question.

Ownership factor: The belonging element, or something you have, might be any qualification in view of things that the client can claim and convey with them, including equipment gadgets, similar to a security token or a cell phone used to acknowledge an instant message or to run a verification application that can produce a one-time secret key (OTP) or PIN.

- **Inherence factor:** The inherence element, or something you are, is commonly founded on some type of biometric distinguishing proof, including fingerprints or thumbprints, facial acknowledgment, retina check or some other type of biometric information.
- **Area factor:** Where you are might be less explicit, yet the area factor is some of the time utilized as an extra to different variables. Area not entirely settled to sensible exactness by gadgets outfitted with the Global Positioning System or with less precision by checking network locations and courses. The area factor can't generally remain all alone for validation, however it can enhance different variables by giving a method for precluding a few solicitations. For instance, it can forestall an aggressor situated in a far off geological region from acting like a client who ordinarily signs in just from their home or office in the association's nation of origin.
- **Time factor:** Like the area factor, the time variable, or when you are confirming, isn't adequate all alone, yet it tends to be a supplemental component for getting rid of aggressors who endeavor to get to an asset when that asset isn't free to the approved client. It might likewise be utilized along with area. For instance, assuming the client was last confirmed around early afternoon in the U.S., an endeavor to verify from Asia one hour after the fact would be dismissed in light of the mix of general setting.

4. CLIENT VALIDATION VERSUS MACHINE VERIFICATION

Machines likewise need to approve their mechanized activities inside an organization. Online reinforcement administrations, fixing and refreshing frameworks, and remote observing frameworks, for example, those utilized in telemedicine and shrewd network advancements, all need to safely validate to confirm that it is the approved framework associated with a communication and not a programmer.

Machine validation can be completed with machine certifications, like a client's ID and secret phrase yet put together by the gadget being referred to. Machine verification may likewise utilize advanced testaments gave and checked by a declaration authority as a feature of a public key foundation to demonstrate recognizable proof while trading data over the web.

With the expanding number of web empowered gadgets, dependable machine verification is urgent to empower secure correspondence for home mechanization and other web of things applications, where practically any element might be made addressable and ready to trade information over an organization. It is essential to understand that each passageway is a potential interruption point. Each arranged gadget needs solid machine confirmation, and in spite of their regularly restricted movement, these gadgets should be designed for restricted

authorizations admittance to confine what should be possible regardless of whether they are penetrated.

5. CONCLUSION

IoT security and protection are of vital significance and assume an essential part in the commercialization of the IoT innovation. Conventional security and protection arrangements experience the ill effects of various issues that are connected with the unique idea of the IoT organizations. ML and all the more explicitly DL and DRL methods can be utilized to empower the IoT gadgets to adjust to their dynamic climate. These learning procedures can uphold self-putting together activity and furthermore upgrade the general framework execution by gaining and handling factual data from the climate (for example human clients and IoT gadgets). These learning methods are intrinsically conveyed and don't need incorporated correspondence among gadget and regulator. Besides, new crossover learning methodologies and novel information perception strategies will be expected for natural and proficient information translation.

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Chapter-6

A Comprehensive Survey on Association Rule Mining Algorithms

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Abstract *-Association rule mining is used to mine association rules for datasets. These rules are going to generated depending on frequent itemsets which are mined by specific algorithms from quality measures like support and confidence. Association rule tells about the relation or association of various items in the dataset. There are many ARM algorithms which tell about the association of items which are frequently happen. It discovers the useful information from large amount of relational databases. In this paper we mainly focus on various association rule mining algorithms like Apriori, Fp-growth, DHCP. We have performed many experiments and differentiated the performance of our algorithm with existing algorithms found in the literature. Experimental results show that our approach can quickly and easily discover the frequent item sets and effectively mine potential association rules.*

Keywords: *Frequent itemset mining, FP-Growth, Apriori, DHCP*

1. Introduction

Data mining coming from the rapid growth of information is the process to extract, identify and find the potentially useful and ultimately understandable knowledge from the data. Data mining technology is to identify patterns [1][2] of data in the data already existed, to help users understand the existing information and predict for the future conditions on the basis of existing information. Association rule mining is an important research branch of data mining, mainly used to discover the relevant links between items in the data set. Apriori algorithm and FP-Tree algorithm [3] are classical algorithms in association rule mining, both mining based on that the amount of data in the transaction database will not change and each data item has equal importance. However, in actual application, data in the database is constantly changing, and people's concern for different data items is not the same. If we still use the traditional mining algorithms for association rule mining, the mining efficiency will be very low, and the mining results are not accurate enough. Therefore it is necessary to improve the existing data mining algorithms to meet the needs of association rule mining.

$$
\begin{aligned}
\text{support}(A \Rightarrow B) &= P(A \cup B) \\
\text{confidence}(A \Rightarrow B) &= P(B|A) \\
&= \frac{P(A \cup B)}{P(A)} \\
\text{lift}(A \Rightarrow B) &= \frac{\text{confidence}(A \Rightarrow B)}{P(B)} \\
&= \frac{P(A \cup B)}{P(A)P(B)}
\end{aligned}
$$

An association rule is a pattern of the form X ,Y,Z [support, confidence],[5] where X, Y, and Z are items in the dataset. The left hand side of the rule X & Y is called the antecedent of

the rule and the right hand side Z is called the consequent of the rule. This means that given X and Y there is some association with Z. Within the dataset, confidence and support are two measures to determine the certainty or usefulness for each rule. Support is the probability that a set of items in the dataset contains both the antecedent and consequent of the rule or P (X $\Box$ Y $\Box$ Z)[6]. Confidence is the probability that a set of items containing the antecedent also contains the consequent or P (Z$\Box$ X $\Box$ Y). Typically an association rule is called strong if it satisfies both a minimum support threshold and a minimum confidence threshold that is determined by the user.
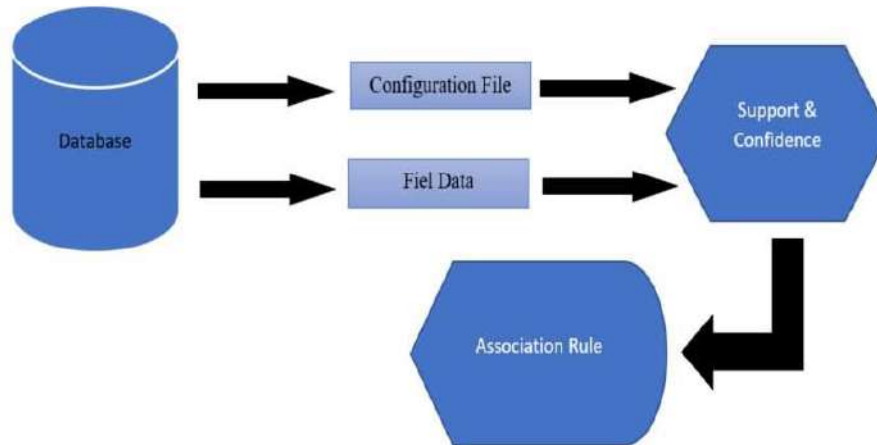

Fig.1: ARM Process

Main challenges in developing association rules mining algorithms are the large number of rules generated that makes the algorithms inefficient and makes it complicated for end users to comprehend the generated rules. It is because of the many traditional association rule mining approaches adopt an iterative technique to discover association rule, which requires many calculations and a difficult transaction process. Furthermore, the existing mining Due to high and repeated disk access overhead the existing algorithms cannot perform efficiently. By keeping this thing in mind, in this paper we present a novel association rule mining approach that can efficiently find the association rules in large databases. By using the conventional Apriority approach with added features to improve data mining performance has been derived in the proposed approach.

In this year the development of data mining systems has received a great deal of attention. In a wide variety of business environments it plays a key enabling for competitive businesses role. It has been extensively applied to a wide variety of applications like manufacturing Ecommerce, healthcare and sales analysis etc. A number of studies have been made on efficient data mining methods and the relevant applications. For knowledge discovery and generating the rules by applying our developed approach on real and synthetic databases we considered association rules
in this study.

2. Apriori algorithm

Apriori algorithm[7][8] plays a key role in frequent itemset generation. This is done by generating candidate key at each itemset level. From those generated itemsets, the rules are going to be generated by considering two qualitative measures support [15][16] and confidence. In apriori we have two levls[13] ,one is join level and other is prune level. At join level the all itemsets are generated with the help of candidatekey generation[10] and at prune level those itemsets are pruned against support measure[11].
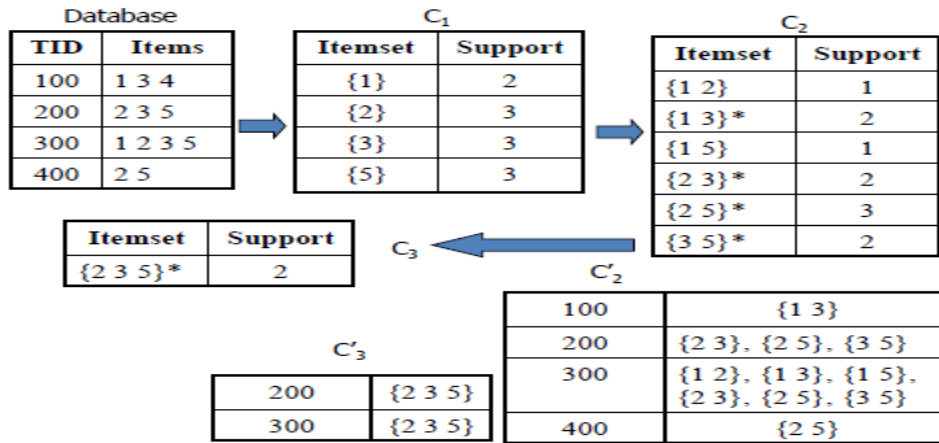
Fig.2: Apriori algorithm

It is a variation of the Apriori Tid algorithm of the Apriori algorithm. Before the pass begins the Apriori Tid algorithm also determines the candidate item sets. The Apriori Tid algorithm does not use the database for counting support after the first pass is the main difference from the Apriori algorithm Instead. Identifier TID is used for counting the large k item set in the transaction. The large item sets that would have been generated at each pass may be huge if we perform this scheme for counting large item sets in the downside manner.

3. FP-growth algorithm

FP-growth algorithm is another kind of frequent itemset generation [8]. It is different from apriori in candidate key generation. In fp-growth we don't have candidate key. Its works by generating a fp-tree structure in which each node in the tree was linked to an itemset. The following figure explains about Fp-tree generation [14] from given dataset. The dataset is scanned transaction by transaction and the fp-tree is going to be formed from those items. If the same item encountered again then then the tree node link count will increase depending frequent item order.
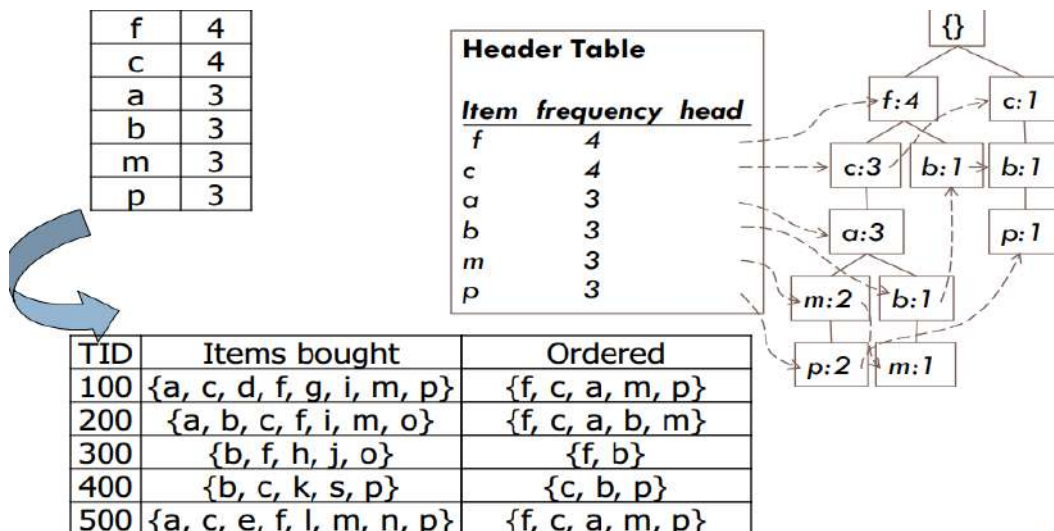

Fig.3: FP-growth algorithm

4. **DHP Algorithm**

For the candidate set generation the DHP (Direct Hashing and Pruning) algorithm [12] is an effective hash based algorithm. By filtering any k item set out of the hash table it reduces the size of candidate set if the hash entry does not have minimum support. Regarding the support of each item set the hash table structure contains the whole information. The algorithm DHP algorithm contains of three steps. Getting a set of large 1-itemsets and constructing a hash table for 2 item sets is the first step. The generation of the set of candidate item sets Ck is done in the second step. Inorder to perform the other third step the same second step is repeated in determining whether to include a particular item set into the candidate item sets except it does not use the hash table. When the number of hash buckets with a support count greater than or equal to the minimum transaction support required is less than a predefined threshold it should be for later iterations further.

Basic Idea: – Use hashing to filter out unnecessary itemsets for the next candidate itemset generation • Implementation: – Accumulate information about (k+1)-itemsets in advance in such a way so that all possible (k+1)-itemsets of each transaction after some pruning are hashed into a hash table • Each bucket in the hash table consists of the count of itemsets that have been hashed into the bucket so far

TID	Items
1	{A,B}
2	{B,C,D}
3	{A,B,C,D}
4	{A,B,D}
5	{A,B,C,D}

Itemset	Support
{A}	4
{B}	5
{C}	3
{D}	4
{A,B}	4
{A,C}	2
{A,D}	3
{B,C}	3
{B,D}	4
{C,D}	3

Itemset	Support
{A,B,C}	2
{A,B,D}	3
{A,C,D}	2
{B,C,D}	3
{A,B,C,D}	2

Given a frequent itemset L, find all non-empty subsets $f \subset L$ such that $f \to L - f$ satisfies the minimum confidence requirement – If {A,B,C,D} is a frequent itemset, candidate rules: ABC →D, ABD →C, ACD →B, BCD →A, A →BCD, B →ACD, C →ABD, D →ABC, AB →CD, AC → BD, AD → BC, BC →AD, BD →AC, CD →AB • If |L| = n, then there are 2n – 2 candidate association rules (ignoring $L \to \emptyset$ and $\emptyset \to L$)

5. **Results**

Four real databases (Chess, Mushroom, Retail and Accidents) are used in the experiments, which obtained from frequent itemset mining data set repository.

TABLE: 1 DATASETS

Dataset	#Trans (DB)	#Trans (db)	#Items	TransSize
Chess	2,696	500	75	37
Mushroom	7,125	1000	119	23
Retail	80,000	8,163	57	13
Accidents	306,183	34,000	468	33.8

The below table and graph explores the time and efficiency levels of all 3 algorithms for different dissimilar datasets.

TABLE: 2 Comparisons

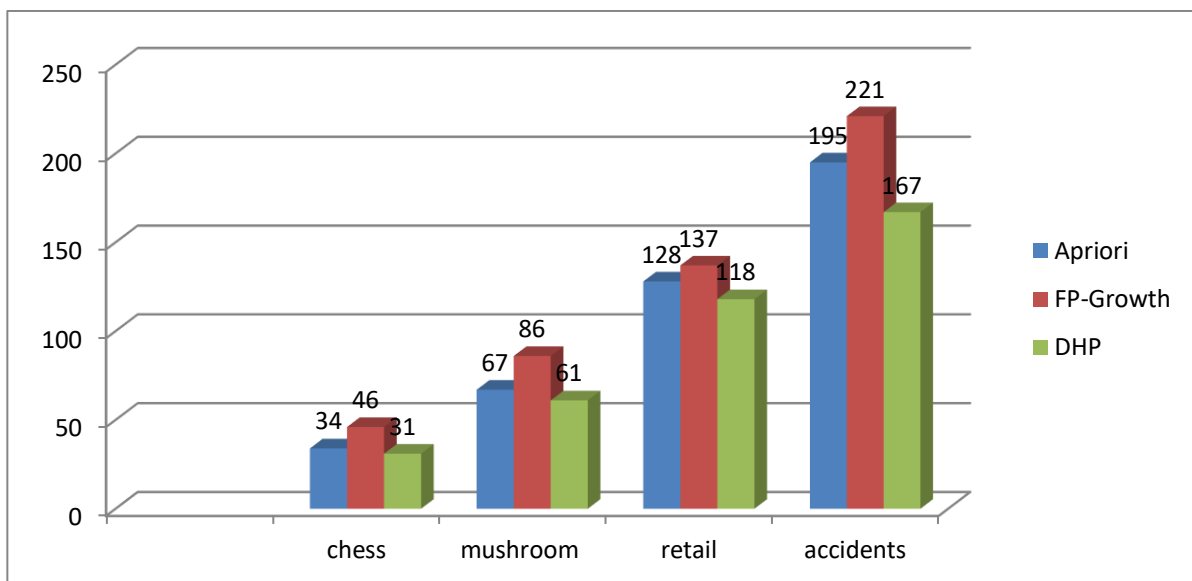| Algorithm /TIME (SEC)	chess	mushroom	retail	accidents	Efficiency level
Apriori	34	67	128	195	Less
FP-Growth	46	86	137	221	Moderate
DHP	31	61	118	167	High

Fig.4: Comparison of all algorithms vs datasets

6. CONCLUSION

The aim of this paper is to improve the performance of the conventional Apriori algorithm that mines association rules by presenting fast and scalable algorithm for discovering association rules in large databases. The approach to attain the desired improvement is to create a more efficient new algorithm out of the conventional one by adding new features to the Apriori approach. Apart from the support count various other factors like candidate count, algorithm stopping size, frequent item set count, maximum memory usage and total time are also accounted. In particular, at most one scan of the whole database is needed during the run of the algorithm. Hence, the high repeated disk overhead incurred in other mining algorithms can be reduced significantly. We compared our algorithm to the previously proposed algorithms found in literature. The findings from different experiments have confirmed that our proposed approach is the most efficient among the others. It can speed up the data mining process significantly as demonstrated in the performance comparison.

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Chapter-7

Smart IoT Systems for Monitoring Health Conditions using ML

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Abstract-Hospitals has vast amount of data related to patents diseases. Handling or processing is one in all methods regularly utilized. This strategy predicts the emerging potential outcomes of cardiac illness. The results of this strategy are to predict the previous cardiovascular malady. The task manages IOT using with the use of IoT Device the readings of sensor are perused in goggle sheet which is then changed over into csv. The datasets utilized are grouped as far as beneficial parameters which are additionally utilized for preparing and testing the information. This strategy assesse those parameters utilizing information preparing order method and also study created an automated artifact detection method for BP, heartbeat rate and PPG signals. It was proposed to automatically remove outlier points generated by movement artifacts from the blood pressure signal. With the work of AI calculations and classification. Initially, the dataset is divided, watched and screened by ML based algorithms, at that point the obtained information is handled in python programming utilizing Machine Learning Algorithm to be specific Decision Tree Algorithm and Random backwoods classifier Algorithm like KNN, Random Forest, Decision Tree and SVM (Support vector machine). The algorithms were helped to analyze and classify the patient data. Henceforth the proposed framework is proved to be dense one for predicting prior heart diseases.

Keywords: IoT, KNN, SVM, AI

1. Introduction

Healthcare plays a vital role in our daily life. Health diseases can be diagonal zed and prevented at the early stages with proper treatment. The abnormalities present inside our body or under the skin can be easily identified by using various curing equipment like CT, MRI, PET etc. Also, certain uncommon diseases like heart attack, heart stroke can be easily prevented at the early stages as they occur. Due to the tremendous increase in the population of the world, there is an unpredictable spread of degenerative illness in huge number which has created a trouble on modern health care systems, and the demand for funding from hospital beds to doctors and nurses is exceedingly high. To maintain the standard and quality of the health care provided at its most favorable level, there is a need to reduce the burden on healthcare systems. The Internet of Things (IoT) is a potential solution to decrease the pressures on healthcare systems. Prior, the incidental checking of patients with diabetics is nitty gritty in and furthermore observing of patients with explicit infection, for example, Parkinson ailment is portrayed in. Researchers are looking forward to serve specific purposes for curing diseases at the early stage, so various rehabilitation technique such as aiding rehabilitation are done so as to monitor the patients progress continuously.

Age-related problems such as stress, anxiety, and hypertension necessitate specific attention in this setting. Stress, anxiety, and blood pressure monitoring can prevent long-term

damage by detecting problems early. This will increase the quality of life and reduce caregiver stress and healthcare costs. Determine fresh technology solutions for real-time stress, anxiety, and blood pressure monitoring using discreet wearable sensors and machine learning approaches. This study created an automated artifacts detection method for BP and PPG signals.
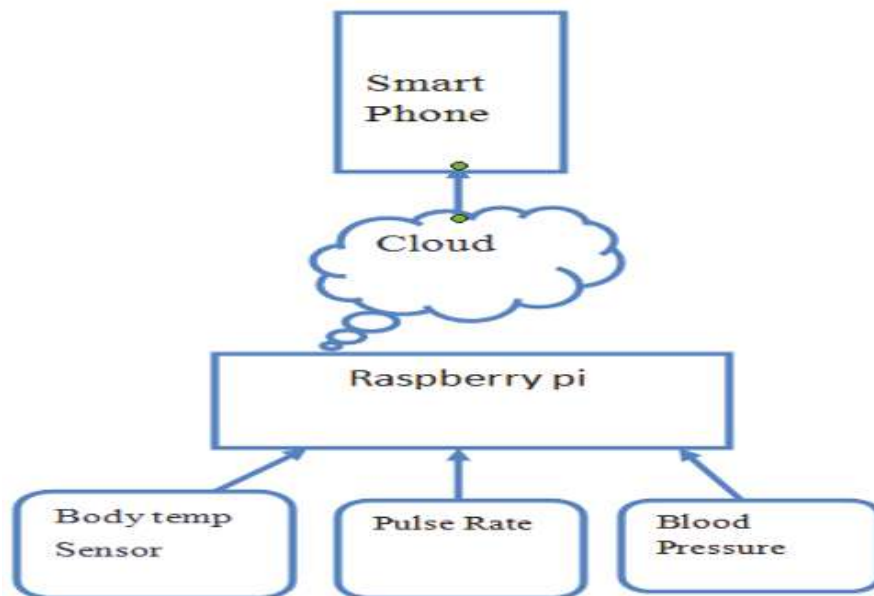

Fig.1: Sensing by IoT RaspberryPi device

AI might be a field which might be a subset of man-made reasoning (AI). Applying man-made reasoning, we will manufacture better a higher future. AI might be a mastermind to pick up from points of reference and information, without being explicitly altered. Instead of composing code, the data is bolstered to the conventional calculation, and rationale is given dependent on the data. AI is drilled in web look, spam sifting, advertisement position, stock exchanging, etc. Despite the fact that gaining from this abundant information is foreseen to bring significant science and designing advances together with upgrades in nature of our life, it brings huge experiences at the indistinguishable time. A report from McKinsey Global Institute confirm that AI will be the driver of the resulting huge influx of development Internet of Things (IoT) conceptualizes the possibility of remotely partner and checking true articles (things) through the Internet. These days Health-care Environment has explained science and information dependent on Wireless- Sensing hub Technology arranged. Patients are confronting an unsure circumstance of prevision end because of the particular explanation of heart issues and assault which is a direct result of nonexistence of good therapeutic upkeep to atients at the required time. We have additionally observed ML procedures being utilized in ongoing improvements in different territories of the Internet of Things (IoT). AI is broadly utilized these days in numerous business applications like web-based business and some more. Information preparing is removing data and information from immense measure of data. Data mining is a basic advance in finding information from database or constant information. Information preparing is basically used to separate the concealed data from a lot of database.

2. Related Survey

Another component and its linked intricate factors may evolve as the result of an initial health concern caused by one aspect. The concept map in Figure 1 helps to show the relationship between the three aspects. Figure 1 depicts some of the symptoms of stress, such as headaches and dizziness suffering can be classified as either distress or eustress, with distress

being the more detrimental of the two. It is important to remember that the length of stress is likewise divided into three categories: short term, episodic, and long term. Acute stress is characterized by being short and sharp in duration, while episodic acute stress is characterized by recurrence. Stress can lead to a lack of adaptation, which can have serious consequences on relationships, employment, health, and even on one's personal well-being in the form of emotional breakdowns [4]. It is critical to be able to develop a self-monitoring strategy for dealing with stress. A way for consumers to adapt is created by incorporating these approaches into the Internet of Medical Things (IoMT).
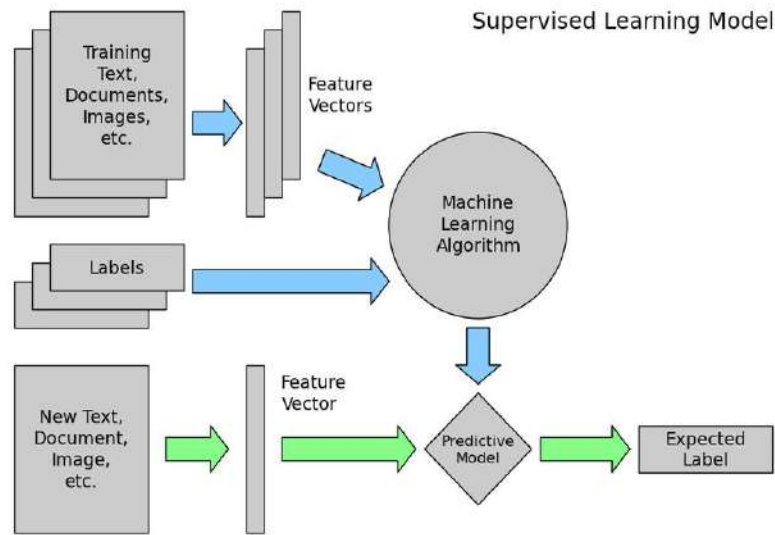

Fig.2: ML model for data classification and prediction

Yuvaraj and SriPreethaa created a wearable medical sensor (WMS) platform made up of different applications and utilities [8]. The authors comprehensively analyzed the application of WMSs and their advances and compared their performance with other platforms. The authors discussed the advantages brought about by the applications of these devices in monitoring the health of patients with conditions such as cardiac arrest and Alzheimer's disease. Miotto et al. proposed a monitoring system that relies on a wireless sensor network (WSN) and fuzzy logic network [9]. Specifically, the researcher's integrated micro-electromechanical systems (MEMS) set up with WSN to create a body sensor network (BSN) that regularly monitors abnormal changes in patients' health. Notably, the authors developed a clinical data measuring system using devices such as a microcontroller, pulse, and temperature sensor [10]. Additionally, the proposed system was integrated with base station appliances to remotely regulate the pulse and temperature of patients as well as convey the patient's data to the medical practitioner's phone. Notably, the system can send an SMS to both the patient's relatives and medical experts in emergency scenarios [3]

The IoT offers systems for supervising and monitoring patients via sensor networks made up of both software and hardware. The latter includes appliances such as the Raspberry Pi board, blood pressure sensors, temperature sensors, and heart rate sensors. The software process entails the recording of sensor data, data cloud storage, and the evaluation of information stored in the cloud to assess for health anomalies [15]. Nonetheless, anomalies usually develop when there exist anonymous activities in unknown body parts. For instance, the heartbeat tends to be elevated when seizures occur in the brain [16]. As a result, machine learning techniques are applied to integrate the heart rate sensor with Raspberry Pi boards to display abnormal results via either an LCD or a serial monitor. Due to the vast volume of data, cloud computing is

applied to store the information and enhance data analysis [17]. Various open-source cloud computing platforms are compatible with the Raspbian Jessi and Raspberry Pi board [18]. These devices utilize machine learning algorithms to assess the stored data to recognize the existence of any anomalies [19]. Therefore, the application of machine learning in IoT helps in predicting anomalies resulting from unrecognized activities in different body parts.

3. Approach

3.1 Heartbeat sensor: Pulse Sensor is an effective fitting and attachment play nnbeat sensor for Arduino. The sensor cuts onto a fingertip and expansion straightforwardly into Arduino. It furthermore joins an open-source watching application that diagrams your pulse in certified time. The front of the sensor is that is verified with the heart shape logo. This is routinely the side that produces contact with the skin. On the front you see a little low round hole, which is the spot the LED emanates through from the back, and there is moreover to some degree square imperceptibly underneath the LED. The LED gleam light into the fingertip or ear ligament, or other thin tissue, and sensor scrutinizes the proportion of light that bounces back. That is the manner in which it learns the beat. The opposite side of the sensor is the spot the remaining of the parts are mounted. Dataset: An informational index (or dataset) is a lot of information. An individual column of information is called an example. It is a perception from the space. An assortment of examples is a dataset and when working with AI techniques we ordinarily need a couple datasets for various purposes. The information is then prepared and tried utilizing AI calculations.
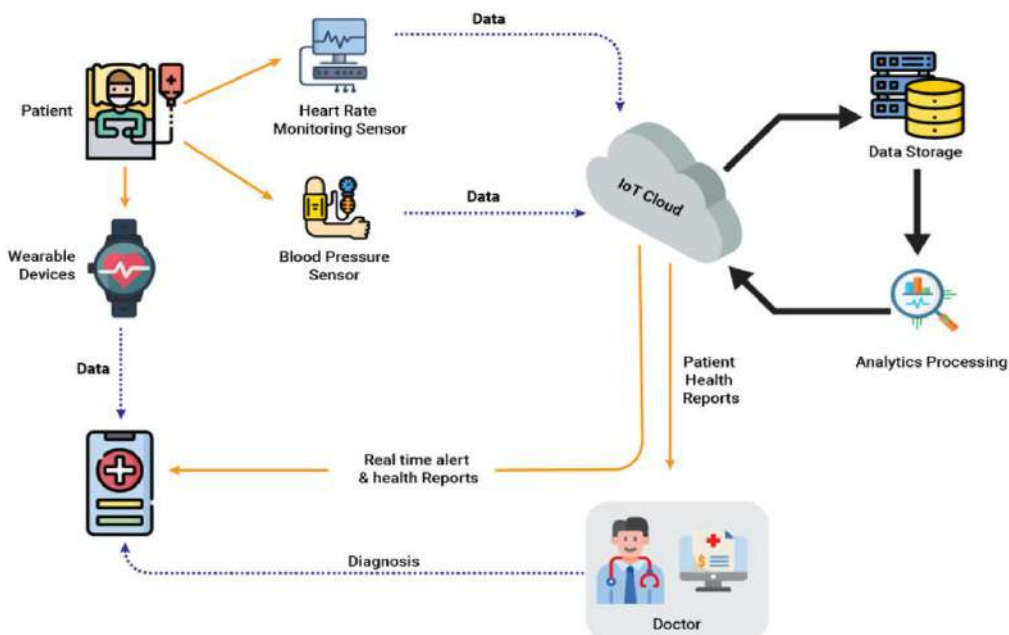

Fig.3: Proposed model for monitoring

3.2 Information Preprocessing: Pre-processing deals with recommends the movements applied to our information before supporting it to the figuring. Information Pre-processing is a structure that changes over the grungy information into an impeccable educational record. Some defined AI model needs data in a predefined position, for instance, Random Forest calculation doesn't fortify invalid attributes, therefore to execute flighty backwoods check invalid qualities must be dministered from the chief unpleasant educational record. Another perspective is that enlightening assortment should be organized with the goal that more than one Machine

Learning and Deep Learning estimations are executed in one instructive record, and best out of them is picked.

3.3 Machine learning classifiers:

a) Support Vector Machine: The SVM is an AI characterization calculation which has been for the most partutilized for arrangement issues. Because of the high achievement of SVM in arrangement, different applications generally applied it. In a twofold characterization issue, the occurrences are isolated with a hyper plane wTx + b = 0, where w and b are dimensional coefficient vectors, which are standard to the surface, b is adjusted a motivator from the earliest starting point stage, and x is enlightening assortment regards.

b)Decision Tree Classifier: A Decision tree is an overseen AI computation. A Decision tree shape is just a tree where every handle is a leaf center point or decision center point. The techniques for the Decision tree are immediate and suitably reasonable for how to take the decision. A decision tree contained inside and outer focus focuses related with one another.

c) K-Nearest Neighbor: K-NN is an overseen learning game plan computation. K-NN estimation predicts the class name of another data; K-NN utilizes the correspondence of new commitment to its wellsprings of information tests in the readiness set. If the new data is same as the models in the arrangement set. The K-NN gathering execution isn't worthy. Let (x, y) be the readiness discernments and the learning limit h: X Y, with the objective that given recognition x, h(x) can choose y regard.

d) Random forest: Random forest is a Supervised Machine Learning Algorithm that is used widely in Classification and Regression problems. It builds decision trees on different samples and takes their majority vote for classification and average in case of regression. One of the most important features of the Random Forest Algorithm is that it can handle the data set containing continuous variables as in the case of regression and categorical variables as in the case of classification. It performs better results for classification problems.

4. Results

The below table explains the time taken to classify data and accuracy levels

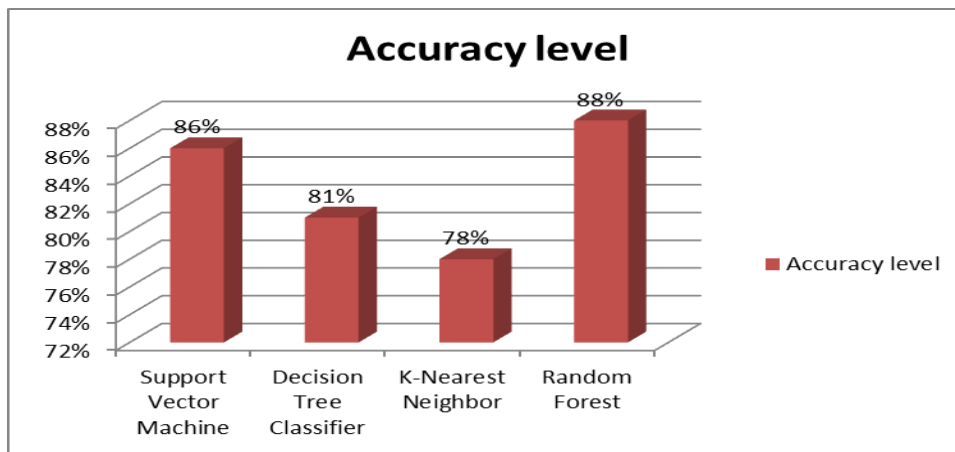|	Time to Classify	Accuracy level
Support Vector Machine	128 ns	86%
Decision Tree Classifier	139 ns	81%
K-Nearest Neighbor	169 ns	78%
Random Forest	124 ns	88%

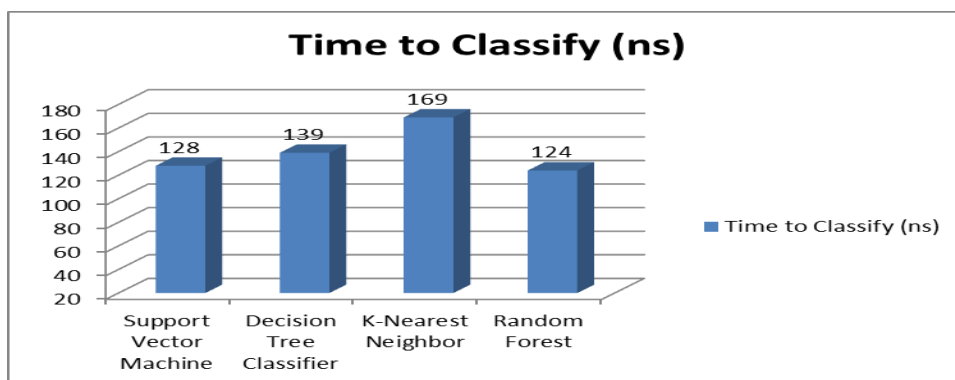Fig.4: Accuracy level comparison for all algorithms

Fig.5: Classification Time comparison for all algorithms

5. Conclusion

Since coronary ailment is that the guideline reason for passing all over the planet. Human administrations field contains a colossal proportion of data, for taking care of those data certain strategies are used. Taking care of or handling is one in all techniques consistently used. Consequently, this paper centers on the ongoing information for more precise expectation and precision utilizing IOT and AI. The information is seen in the goggle sheet and further utilized in machine calculations. In this way, I saw that when all calculations are contrasted and one another, it is gotten that KNN calculation gives 78% exactness, support vector machine gives 86% exactness, Decision tree gives 81% exactness and Random Forest 88% exactness. Hence, support vector machine (SVM) gives most noteworthy precision when contrasted with all calculations. The proposed equipment as well as programming framework helps patient to anticipate coronary illness in beginning phases. It will be useful for mass screening framework in towns where medical clinic facilities are not accessible.

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Chapter-8

A Novel IoT Enabled Devices for Alerting System to Trace Vehicles on Emergency

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Abstract-IoT administrations can make our regular routine more straightforward, more brilliant, and more secure. Utilizing IoT in designing a few exceptional administrations can make a lifeline framework. In the present occupied life, using time productively is vital. Every so often, understudies need to hang tight a significantly longer time for appearance of their school/school vehicle. There exist some correspondence innovations that are utilized to guarantee the using time effectively. In any case, these are unequipped for offering effective types of assistance to understudies. This paper presents the advancement of school vehicle observing framework, equipped for offering useful types of assistance through arising innovation like web of things (IoT). In this paper, we have introduced an IoT empowered approach that can give crisis correspondence and area following administrations in a distant vehicle that meets a sad mishap or some other crisis circumstance. Following a mishap or a crisis, the framework either begins consequently or might be set off physically. The proposed IoT based framework tracks the vehicle utilizing the blend of RFID/GPS advancements. Notwithstanding the following, a forecast calculation is executed for calculation appearance season of school vehicle which will be carried out utilizing the RFID and the GSM advancements. This approach guarantees a helpful procedure that works on the life by supporting easy to understand arrangement. On schedule of crises, prompt attention will be taken and medical aid can be given. The proposed system can perform the real time monitoring of desired area with a good accuracy and efficiency as well.

Keywords--Internet of Things (IoT), RFID, GPS & GSM

1. Introduction

Wireless communication is the transfer of information or signal between two or more points that are not connected by an electrical conductor. In IOT devices equipped with Wi-Fi allow the machine-to-machine communication. Using this from of industrial machines to wearable or wireless devices, using built-in sensors to gather data and take action on that data across a network. The sensor and actuator can be setup in different place but they are working together over an internet network. Using IOT technique a vehicle tracking system (VTS) can be built. A vehicle tracking system combines the use of automatic vehicle location of individual vehicles with software that collects these fleet data for a comprehensive picture of vehicle locations. Modern vehicle tracking systems commonly use GPS technology for locating the vehicle, but other types of automatic vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via internet with specialized software. The history of vehicle tracking dates to the beginning of GPS technology in 1978. Early GPS was designed primarily

only for military but in 1996, President Bill Clinton determined that the system would be an asset to civilians as well as the military. In a smart city every device or better to say every 'thing' is connected 24×7 to the Ubiquitous network. They can communicate to each other regardless of their communication protocols and hardware / software infrastructure. Machine to machine (M2M) communication is rapidly growing to make the machines more intelligent and shared in nature. In this paper, we have used the concept of a smart city to provide a life savior system for a smart vehicle in any kind of emergency situation occurred on road.

The Internet of things (IOT) is the between systems administration of physical gadgets, vehicles, structures, and different things installed with hardware, programming, sensors, actuators, and system availability which empower these items to gather and exchange data. The IOT enables items to be detected or controlled remotely across existing system infrastructure creating open doors for more straightforward of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. Only IOT can connect physical world to the web.
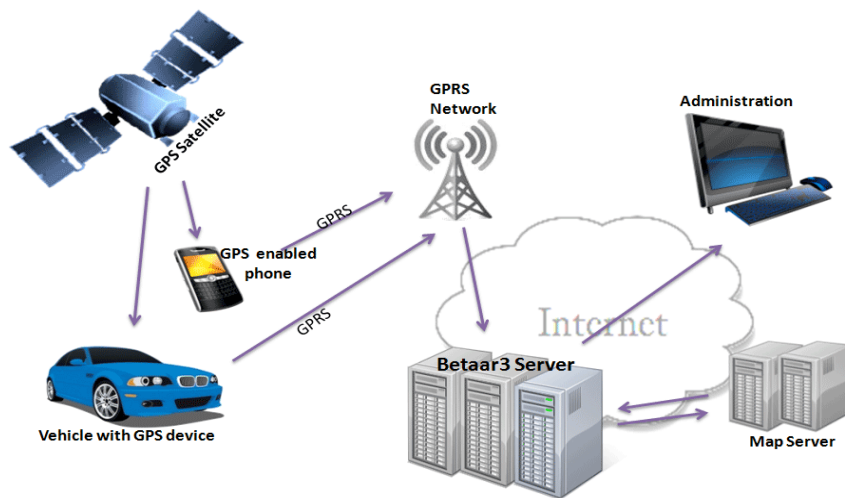

Fig.1 : GPS based tracking system

GPS vehicle following guarantees their security as voyaging. This vehicle subsequent scaffold is exploit as a part of customer's vehicles as a burglary avoidance and safeguard gadget. The cryptogram transmitted by the following scaffold are exploit by vehicle owner or police to find a steal vehicle in equivalent the stolen vehicle motor speed going to receded and pushed to off. Engine can't restart without consent of the secret key when it is switch of by following framework. This scaffold initiate for vehicle following normally handle as a part of naval force administrators for naval force administration work, send off, steering, on board data and security. It can be utilized to screen driving execution of a parent with a high schooled driver. To forestall burglary in purchaser vehicles vehicle following framework is utilized.

2. Survey & Analysis

Manasi Patil et al., suggested a better traffic management system using Raspberry pi and RFID technology. The vehicle has a raspberry pi controller fixed in it which is interfaced with sensors like gas sensor, temperature sensor and shock sensor. These sensors are fixed at a predetermined value before accident. When an accident occurs, the value of one ofthe sensor changes and a message to a predefined number (of the ambulance) is sent through GSM. The GPS module which is also interfaced with the controller also sends the location of the vehicle. When the message is received by the ambulance, a clear route has to be provided to the

ambulance. The ambulance has a controller ARM which is interfaced with the RFID tag sends electromagnetic waves. When an ambulance reaches the traffic signal the RFID reader which is placed on the joints detect the electromagnetic waves of the tag. If the traffic signal is red, then the readers goes through the database in fraction of seconds and turn the red light green. And automatically in such condition the RFID on opposite joints turn the opposite signal red. This provides a clear route to the ambulance.

V.Sagar Reddy et al.,developed an accelerometer based System for driver safety. The system has the advantage of tracking or identifying vehicles location just by sending a SMS or email to the authorized person. The system is designed by using Raspberry Pi (ARM11) for fast access to accelerometer for event detection. Is there any event is occurs the message sent to the authorized person so they can take immediate action to save the lives and reduce the damages. Images captured by the camera on the vehicle are emailed to the concerned person (for example the owner of the vehicle) along with the type of accident and the time of the accident. [2].Sri Krishna

Chaitanya Varma et al., proposed an Automatic Vehicle Accident Detection and Messaging System Using GPS and GSM Modems. AT89C52 microcontroller is used in the system. When the system is switched on, LED is ON indicating that power is supplied to the circuit. When the IR sensors that are used sense any obstacle, they send interrupt to microcontroller. The GPS receives the location of the vehicle that met with an accident and gives the information back. This information is sent to a mobile number as a message. This message is received using GSM modem present in the circuit. The message gives the information of longitude and latitude values. Using these values the position of the vehicle can be estimated.
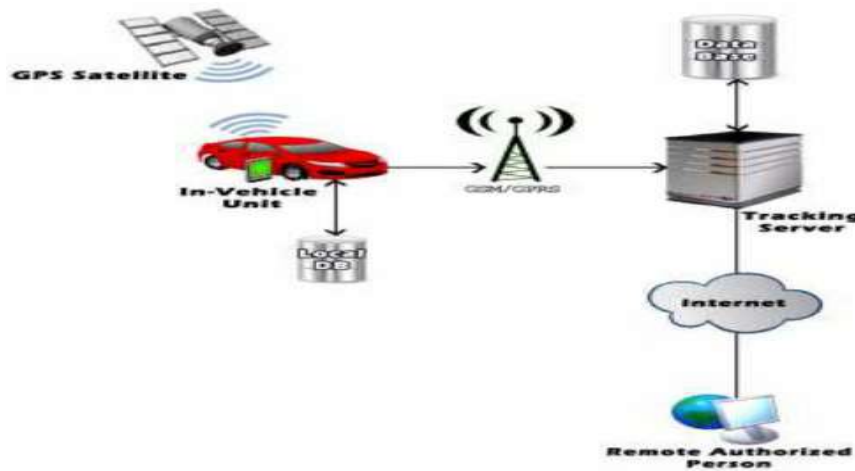

Fig.2 : GPS in Vehicle with server

Apurva Mane et al., described the methods for vehicle collision detection and remote alarm device using Arduino. Key features of this design include real-time vehicle monitoring by sending its information regarding position (longitude, latitude), time, and angle to the monitoring station and to the user/owners mobile that should help them to get medical help if accident or the theft occurs. Also user/owner has an access to get real-time position of a vehicle in real time.

Thompson, Chris, et al. in have introduced a system that can detect an accident by a smart phone's sensors, e.g. accelerometer sensor etc. and the phone uses its 3G connection to transmit accident information. But the system is not integrated into the vehicle and also not fully automated and sometime needs third party reporter to send complete emergency

information along with photos. OnStar from General Motors [13] provides smart assistance to their vehicles by providing driving assistance, route direction, and navigation service to its customers. It also provides emergency communication services through its always connected 4G connection. But with OnStar, the user cans only contact the vehicle's manufacturer or emergency numbers (e.g.
911) and not to the local emergency rescue centers that can cause a delay in rescue.

3. Proposed Approach

In this paper, we have introduced an emergency communication and location tracking system for any type of vehicular emergency. This system aims to minimize the damages after a vehicle meets any unfortunate situation like an accident by sending automatic message to the nearest hospital and police station. It is also helpful for other emergency situations such as medical emergency, criminal problem, civil emergency and also for mechanical problem in the car. When a car meets any emergency situation the system starts automatically or manually according to the type of the situation and sends emergency message to the control room. The control room then forwards the message to the nearest rescue center (hospital, police station, govt. office, car workshop) according to the emergency type and situation and nearest authority for that emergency automatically or manually.
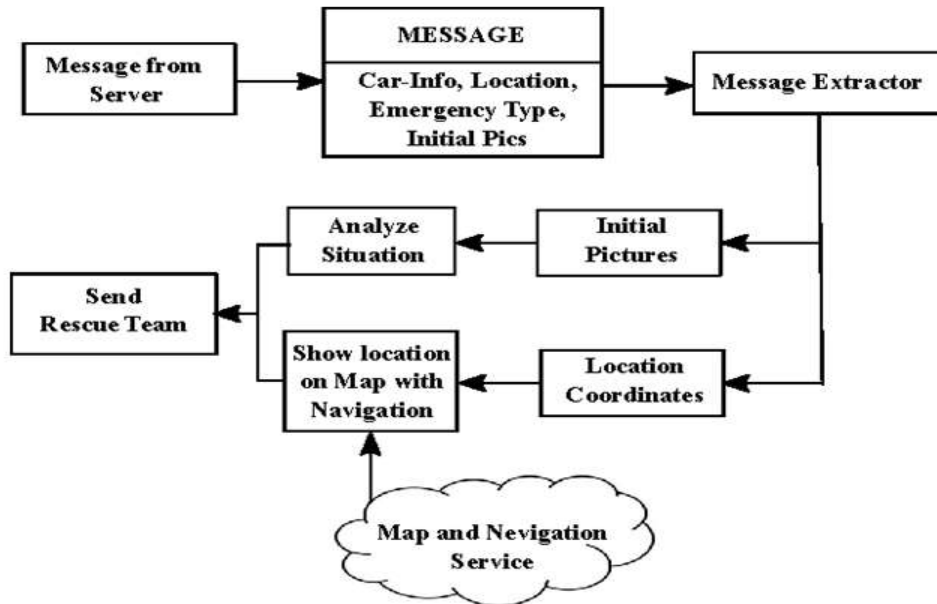

Fig.3 : Tracing system architecture

GPS - Global Positioning System Module is used in cars for each monitoring and navigation. Tracking structures enable a base station to maintain track of the vehicles except the intervention of the driver where, as navigation machine helps the driver to attain the destination. Whether navigation device or tracking system, the architecture is greater or less similar. When an accident passed off in any area then GPS system tracks the role of the automobile and sends the information to the particular individual through GSM with the aid of alerting the man or woman through SMS or by using a call. As an additional option, the location detection can be achieved the usage of Google maps interface.

All different elements like the ultrasonic sensor, accelerometer and GPS and GSM modules are connected by means of STM32F microcontroller. The code for the working of this machine is written in C. The LCD display displays brief messages to keep track of the working

of thesystem. The alarm is brought on when an accident is detected. Accelerometer is used to detect crash or rollover of the automobile and sends indicators when an accident happens to the microcontroller. The ultrasonic sensor detects whether or now not the accident came about due to an obstacle.

A buzzer or beeper is a signaling device; it gives an audible warning when an accident occurs. If it is a false alarm or if the driver feels that he does no longer want instantaneous help, there is a switch in the system that he can use to quit the working of the system. Vibration sensor and carbon monoxide sensor both have a predefined threshold values set (in this case vibration degree of 60 and carbon monoxide range of 300). If that threshold value exceeds in the vehicle, the notification of emergency is sent to
the administrator.

4. Results

Proposed emergency communication system is able to send automatic message to the control room with all relevant information of an emergency. A snap shot from the emergency control room is shown in fig. where the emergency location is shown in the map that helps the rescue team to reach the location at earliest. All nearby rescue centers are shown in the map and also the nearest one is calculated from the database. An automatic message is sent to them. There are buttons for the control room operator to send the message manually to other rescue centers if he thinks is required. The initial image taken by the car camera is also shown in the interface that can help the authorities to understand the situation. An example screen shot of the control room Compared to other systems, it is a fully automated system that can automatically find out nearest rescue centers and send emergency message to them.

Approach	Model	Tracking efficiency	Target
Existing approach	Manual tracking	Moderate	Friends/Police station
Proposed approach	Location based	High	Nearby ambulance

5. Conclusion

This approach guarantees an advantageous method that works on the life by supporting easy to use arrangement. The vehicle can be handily followed and furthermore significant notices are gotten. On schedule of crises, prompt attention will be taken and emergency treatment can be given. The framework is especially useful for aversion of street mishaps and emergency vehicle supply. Utilizing this framework we can do constant reconnaissance of vehicles and crisis systems. This Scheme is completely robotized, along these lines it observes the mishap spot, controls the traffic signals, assisting with arriving at the emergency clinic on schedule. This framework can be important for transportation vehicles, determined vehicles. With this following data we can without a very remarkable stretch track the vehicle. In business this framework upgrades security and prosperity, correspondence medium and constructs the productivity. With additional exploration and development, this venture can be executed in various areas of safety and observation. The system can perform the real time monitoring of desired area with a good accuracy.

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Chapter-9

AN EFFICIENT REVIEW OF IDS IN MANET USING PSO

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ABSTRACT: The region of Mobile Adhoc Network (MANET) has being a requested *subject of examination for over 10 years on account of its appealing correspondence highlights related with different issues. Intrusion detection system (IDS) as we said before is an irreplaceable second line of resistance since conventional anticipation instruments are not sufficiently able to secure MANET. The trust highlights are removed from every node of MANET and these highlights are enhanced utilizing Particle Swarm Optimization (PSO) algorithm as highlight optimization strategy. These upgraded include sets are then arranged utilizing Neural Networks (NN) classifier which distinguishes the gatecrasher node.In this review paper we are elaborating the recent related reviews of intrusion detection systems in MANET by using the novel concept of artificial intelligence.*

KEYWORDS: *Mobile adhoc network, Particle swarm optimization, Security, Neural network*

I. INTRODUCTION

In Mobile Ad hoc Networks (MANET), nodes are self-sorted out and utilize wireless connections for correspondence between themselves. They powerfully structure a transitory network without utilizing any current network framework or concentrated organization. These are regularly called framework less networking since the mobile nodes in the network progressively build up routing ways between themselves.

A MANET is a self-sufficient system in which numerous hosts are associated with one another utilizing multihop wireless connections (Figure 1). This is a networking system that doesn't rely upon a perpetual spine or fixed framework and comprises of gadgets on the fly that are sent for some particular applications. Such networks are generally reasonable in circumstances where the foundation isn't accessible or arrangement of the framework isn't financially savvy like inquiry and salvage tasks, catastrophe recuperation, military administrations, and correspondence among vehicles and side of the road hardware as vehicular specially appointed networks.

Be that as it may, the administration of such networks is troublesome because of its self-designing nature and nonappearance of any focal power. Besides, versatility is another issue which is a decades ago gets one of the most centered around territories of the correspondence research world.
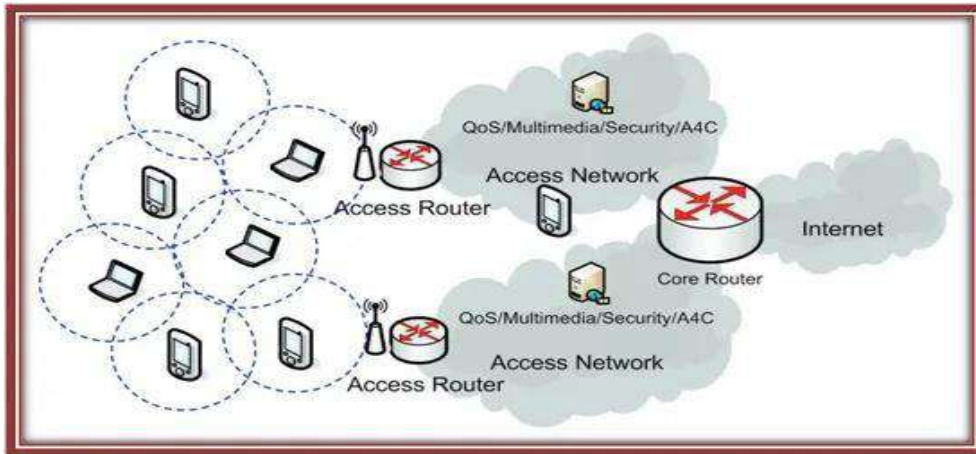
Figure 1: MANET architecture

Particle Swarm Optimization: Swarm Intelligence (SI) is a part of EC wherein the elements of gathering is liable for its endurance. In SI, a gathering of people or particles help out one another to discover ideal answer for the issue close by to date, a few swarm knowledge models dependent on various common swarm systems have been proposed in the writing, and effectively applied in some genuine applications. Swarm knowledge is characterized as the communitarian execution of unconsolidated and auto composed gathering. These comprise of rudimentary agents cooperating with the circumstance and among them. The delegates collaborate and indiscriminately, without keeping up any standards. All inclusive the perspectives of these unassuming agents end up being "shrewd". Food and nectar looking through procedures of ants and honey bees individually are examples of such conduct. The practices of swarms are like mobile specially appointed networks (MANETs). A swarm is an impressive number of the same, fundamental managers' accomplice locally among themselves, and their condition, with no key control to engage a general intriguing conduct to make. Swarm-based tallies have firing late come up as a social affair of nature-prodded, masses based figuring that are good for making unimportant effort, smart, and strong reactions for a few complex issues. Swarm Intelligence (SI) is a part of Artificial Intelligence that is utilized to show the corporative lead of social swarms in nature, for example, underground dreadful little creature states, bumble bees, and feathered creature runs.
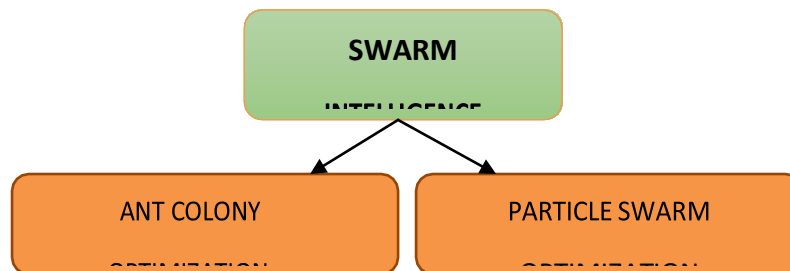

Figure 2: Type of swarm Intelligence

COMPONENTS OF INTRUSION DETECTION SYSTEM

There are three significant parts utilized in the IDS are:

Event Creator: The occasion generator is the principal segment of the IDS. It is the

information source answerable for producing information in the network. The wellspring of the information is ordered into four kinds of screens to be specific: have, network, application, and target.

Analysis Engine: This system gets the data from wellspring of information and tests information for any assaults or infringement. It utilizes any of the accompanying methodologies are Signature-based and anomaly-based detection.

Response Manager: The response manager acts just when there is any error found on the network. It reacts to somebody as a response with respect to the assaults found on the system.

TYPE OF DETECTION APPROACHES

Intrusion detection is ordered dependent on detection into two classifications anomaly and signature.

Signature-Based Detection: The IDS utilizes SBD, which depends on the traffic of the information for breaking down the undesirable traffic. It is quick and simple for arranging the network and the assailant alters the assault and makes it imperceptible. Regardless of the signature based intrusion detection having just a constrained detection limit, it is exact.

Anomaly-Based Detection: The IDS system screens the traffic of the network and recognizes the inaccurate information or strange is called as the anomaly based detection. The strategy is helpful in foreseeing the undesirable traffic in the network. On the off chance that the detection system on anomaly finds the irregular exercises of the network, at that point the Internet Protocol (IP) packet is deformed.

II. LITERATURE REVIEW

Shruti Dixit et al (2019) suggested that the IDS and a response system are incorporated for detection and expulsion of the wellspring of an assault separately. The watchman nodes are put in the network with the intend to contradict dark gap assailants and along these lines IR is started. The noxious nodes identified by PSO are skirted and new routing ways are set up utilizing monitor nodes. This examination has been completed for investigating the impact of noxious nodes and gatekeeper nodes on fluctuating network size the other way around. The simulation investigation of proposed method coordinated particle swarm optimization intrusion detection response system (IPSO-IDRS) clarifies how it is better regarding the presentation metric like throughput and PDR.

Shanthi et al. (2018) talked about the idea of intrusion detection and secure key administration in MANET utilizing trust metric. For every mobile node immediate and aberrant is processed and progressive gathering key administration is proposed for data get to control. Base station is sent in network for bunch key age, dissemination and the executives. Through this work, network lifetime and packet conveyance proportion is improved when nearness of assailants, however assault detection rate with the utilization of trust metric isn't researched.

Singh, O. et al. (2017) proposed the Intelligent Intrusion Detection and Prevention System (IIDPS) for keeping the nodes from different assaults. The IIDPS model handled different

assaults by incorporating the trust manager, which doled out trust an incentive to every node in MANET. Additionally, it utilized predefined limit and hazard factor conditions for guaranteeing the security to the nodes.

Babu, M.R. furthermore, Usha, G.et al. (2016) proposed the Novel Honeypot Based Detection and Isolation (NHBADI) plot for making sure about the MANET from various assaults. The plan chiefly amassed in relieving the dark gap assaults. The utilization of honeypot procedure guaranteed diminished network overhead. At long last, the model segregated the way from nodes influenced by dark opening assaults, and guaranteed security. The plan dismissed other network assaults during the way definition. P. Joshi, et al. (2015) proposed the Enhanced Adaptive Acknowledgment (EAACK) plot for identifying and forestalling noxious assaults. The plan took care of the packet dropping and hacking issues winning in the MANET. The system guaranteed security by characterizing need to every node for way foundation. Despite the fact that the model guaranteed improved security in MANET, all the shortcoming emerging because of the guard dog was not taken care of productively.

Wahab et al. (2016) have introduced intrusion detection plot utilizing SVM over clustered vehicular impromptu networks. Point of this ID model is to lessen size of preparing set for SVM classifier and its bit of leeway is to help for high mobility condition. Different bit capacities are utilized to test the exhibition of SVM. At long last the proposed strategy has demonstrated that it improve the versatility of network concerning number of nodes (ordinary and pernicious). A disadvantage of this work is SVM since it neglected to tune the boundary set and exceptionally complex to get better outcomes.

Khan, F.A., et al. (2017) proposed the Detection and Prevention System (DPS) for taking care of the security cautions emerging because of network assaults. The model utilized some extraordinary nodes for checking the typical nodes in the MANET. In the event that an adjustment in ordinary activity was recognized, at that point the uncommon node announces the node to be dubious. As the extraordinary node utilized in the plan doesn't include in information move, it had upgraded battery life, however expands the network cost.

N. Marchang, et al. (2017) proposed the IDS for recognizing the malignant nodes in MANET by diminishing the general dynamic time of IDS. The model guaranteed secure information transmission over network despite the fact that the dynamic time of IDS was diminished. The model guaranteed secure transmission in homogenous stage, however has fizzled in heterogeneous network. Hoaxes, E.A. furthermore, Rizaner, A. (2017) proposed the IDS dependent on SVM structure. The structure was exceptionally prepared to distinguish the impacts emerging because of the DoS type assaults. As the SVM design had basic structure, the plan distinguished the assaults with less calculation time. The plan expelled noxious nodes from the system, and builtup the made sure about routing way.

Gurung, S. also, Chauhan, S. (2017) presented unique nodes, to be specific Flooding-Intrusion Detection System(F-IDS) for dispensing with the impacts of flooding assaults. The uncommon nodes sent with MANET nodes guaranteed the detection and counteraction of flooding assaults. The effect of address satirizing that raised during flooding was not tended to in the plan.

Darn and Mittal et al, (2012) suggested that the IDS system is an incorporated strategy for recognize any assaults by breaking down and keeps observing network exercises. Intrusion detection systems can be run on every mobile node to check nearby traffic and distinguish

neighborhood intrusions. These nodes can convey nearby intrusion data to one another as and when required. Figure1 show the neighborhood model of intrusion

detection system. Every node has neighborhood IDS that by this, node can interface with network and nearby IDS checking all send or get information in/out node. Other method is to run intrusion detection system for self and neighbor nodes to check for malignant neighbor. The worldwide intrusion detection system can be conveyed for clusters of mobile nodes where head node is liable for worldwide intrusion detection for its cluster.

Theodorakopoulos and Baras (2006) proposed a trust proof assessment plot for MANETs. The assessment procedure is displayed as a way issue in a coordinated chart where nodes show substances and edges speak to confide in relations. The creators utilize the hypothesis of Semirings to show how two nodes can set up trust connections without earlier direct cooperations. Their contextual investigation utilizes the GP web of trust to communicate a model trust model dependent on Semirings and shows that their proposed conspire is robust within the sight of aggressors. In any case, their work expect that trust is transitive. Further, trust and certainty esteems are spoken to as parallel as opposed to as a constant esteemed variable. Despite the fact that no brought together believed outsider exists, their work utilizes a source node as a confided in foundation.

III. CONCLUSION

It has been seen that larger part of the previously mentioned work is centered around presenting a solid security system that either addresses routing conduct or some different variables that legitimately impact node misconduct utilizing SI. In any case, nearly greater part of the work is found to have utilized cryptographic methodology which consistently has a few or other security escape clauses with regards to wireless networking. One of the intriguing investigation was that even game hypothesis has a significant commitment in security of MANET where different methodologies are utilized to alleviate assaults or any pernicious exercises in MANET. Henceforth, the future work could be on the course of presenting a novel model dependent on game hypothesis also Swarm knowledge, which nobody has ever endeavored previously. The eminent commitment of the swarm knowledge can create a proficient security system which can be further increasingly improved by incorporating with game hypothetical idea of imagining and discretizing mobile nodes. We strongly believe that our present review paper is given a very quick overview of the swarm and IDS concept in MANET.

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Chapter-10

REVIEW ON COMPARISON BETWEEN RCC AND STEEL HOPPER WITH WIND AND EARTHQUAKE ANALYSIS USING STAAD- PRO

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ABSTRACT

Silo is one of the storage structure which is predominantly required for industries to store different materials like wheat, grains, concrete, carbon dark, wood chips, food items and sawdust and so forth in mass amounts. Accordingly it is important to decide the brief plan methodology for such structures, similar to silos and its segments utilizing the investigation of codal provisions. Hopper is the real storage zone in the silo, where emptying of materials is completed then again hopper is a silo bottom with slanted dividers where $\alpha > 20°$. There are numerous sorts of silo created in India for storage dependent on the materials put away they are named Bunker silos, tower silos, Bag silos and so on. This paper gives sources to get significant specialized data in the plan of RCC hopper and Steel hopper with wind and earthquake analysis utilizing STAAD PRO. Structural Analysis and Designing Program is a 3D structural analysis and plan programming used to break down and plan different structures. Codal provisions are additionally followed to structure the hoppers dependent on the breeze and earthquake boundaries for explicit zones.

Keywords: STAAD PRO, CODAL PROVISIONS, HOPPER

INTRODUCTION

The plan of silos and their supporting structure to be specific hopper includes three significant components like mass material, geometric and structural contemplations. The fundamental target is to break down and configuration accurately utilizing codal provisions, STAAD Pro and to make a near investigation of RCC hopper and STEEL hopper. for example geometry and structural contemplations. The vertical powers (Dead burden and live burden) alongside the laterals powers like breeze load and Seismic burdens for structural analysis and configuration are applied in stacking mixes and is investigated utilizing STAAD Pro. The adjustments in the bowing second because of different powers are gotten through reenactments and are introduced in [1]. The plan includes load estimations and breaking down the entire structure utilizing STAAD Pro in Limit State Method adjusting to the Indian standard Code of Practice.

LITERATURE REVIEW

Riya Dey et.al. in the journal "Examinations among R.C.C and steel hopper plans", spoke to a 3-D model of Hopper that has been created in STAAD Pro to dissect the conduct of strengthened cement and steel Hopper structure under every plausible burden. This paper clarifies quickly likewise the

impact of wind or earthquake loads on the structures for the near investigation among wind and earthquake consequences for RCC surrounded and steel confined Hopper structure. The significant factor of building lastly soil factor were talking into contemplations and their impacts on the exhibition of structure were examined. Our motivation is to break down and plan both the structure and study the impact on establishment and just as the impact on cost of material for development purposes. The model has been intended for a limit of 40 cubic meter Hopper whose bottom part is tapered.

AkshitaMeshram et al., in the article "Analysis and Design of RCC Silo Structure by Considering Indian Seismic Zones", explained that RCC Silos are utilized by a roomy scope of industries to store mass solids in amounts going from a couple of tones to hundreds or thousands of tones. The term silo incorporates all types of particulate solids storage structure that may some way or another be alluded to as a receptacle, hopper, grain tank or bunker. Silos are requesting in concrete industries. Thus RCC silos are generally utilized for storage of granular materials as they are a perfect structural material for the structure of lasting mass storage offices for dry granular like fillings. At first, solid storage units are practical in structure and sensible in cost. Cement can offer security to the put away materials, requires little upkeep, is tastefully satisfying, and is generally liberated from certain structural dangers, for example, clasping or gouging. In this

undertaking, we are planning the RCC silo arranged in every single seismic zone with the assistance of structural programming STAAD PRO. The plan idea incorporates giving all elements of structural segment dependent on experimentation strategy. The Analysis of silo, utilizing the Equivalent parallel power strategy and study the exhibition of structure situated in every single seismic locale in term of Comparison of various models of solid silo for earthquakes, for example, nodal uprooting, stress and vertical or flat weight on dividers, and so on. The Presentation of the outcomes is in plain and graphical look. This strategy is completed for a volume of 180 m3. All the structures have been founded on the proposals of I.S 4995 - 1974 (section 1&2) and I.S 456 – 2000 codes, Based on these plans, that element of silos shows least measure of cement and steel. These discoveries will be helpful for the planners of silos.

MsRiniRiyansi.E et al., in the journal "Relative investigation of Silo supporting structure utilizing RCC and Steel", expressed that a silo is a structure for putting away mass materials. They are generally utilized for mass storage of coal, concrete, carbon dark, woodchips, food items and sawdust. The plan of silos to store mass solids includes mass materials, geometry and structural contemplations. For the most part the supporting structures are supposed to arrange. Here 3 number of silos are mulled over. In this Project, breaking down, planning and similar examination on silo supporting structure utilizing RCC and STEEL are finished. The General Arrangement (GA) drawings are readied utilizing the 2D drawing programming AUTOCAD and the structural displaying, analysis and configuration should be possible utilizing structural programming STADD PRO v8i. The structural analysis should be possible utilizing firmness lattice technique and the plan will be done dependent on IS code guidelines. For this structure, not just thinking about the vertical powers (Dead burden and live burden) yet in addition considering the laterals powers like breeze load and Seismic burdens for structural analysis and plan.

Sohel Ahmed Quadri et al., in the article "Examination of the basic course of seismic power for the analysis of R.C.C outlines" proclaimed that a basic strategy which can be applied in seismic codes to decide the basic point of seismic occurrence is proposed in this paper. Two 4-story strengthened solid

structures with second opposing casings, one with square and the other with rectangular arrangement, have been examined by Equivalent Static Method of analysis. A lot of qualities from 0 to 90 degrees, with an addition of 10 degrees, have been utilized for edge of excitation. Structures' segments have been isolated into three primary classes, including corner, side, and inward sections, and pivotal power and bowing second qualities in various segments, have been researched in all cases. The outcomes show that the hub powers of sections may surpass the normal cases up to 13% by fluctuating the edge of excitation. Every section gets its most extreme hub power and minutes with a particular edge of excitation, which isn't 0 or 90 degree fundamentally, and it shifts from segment to segment.

Dr. B. Ramesh Babu, in the paper "Neural Network Model for Design of One-Way R.C.C Slabs", communicated that the structure of R.C.C sections includes numerous imperatives like diverse edge conditions, stacking, geometry and I.S. 456-2000 code provisions. The plan needs to fulfill all the limitations. This paper shows the appropriateness of counterfeit neural systems for the structure of one – way pieces in order to fulfill all the plan requirements.

R. R. Gagan Krishna etal., in the work "Analysis of Silo and Comparing Silo with Different End Condition", spoke to that a silo is a structure for putting away mass materials. They are ordinarily utilized for mass storage of coal, concrete, carbon dark, woodchips, food items and sawdust. The plan of silos to store mass solids includes mass materials, geometry and structural contemplations. For the most part the supporting structures are supposed to arrange. Silo structures are for the most part developed with fortified cement. Such structures must have sufficient quality and be in consistence with usefulness necessity as for split widths. This significant plan necessity is accomplished by restricting the tractable worries in cement to be inside reasonable cutoff points as indicated in codes of training. In this investigation an endeavor is made to comprehend the distinctions in structural conduct of silo with two sorts of romanticizing for establishment, for example, unbending and adaptable by utilizing STAAD PRO v8i. For this structure, not just thinking about the vertical powers (dead burden and live burden) yet additionally considering the parallel powers like breeze and seismic burden.

Rakesh Kumaret.al., in the paper "Study on Silos for Safe Storage of Food Grain Using Staad Pro V8i Software", indicated that a silo is a structure for putting away mass materials. They are generally utilized for mass storage of coal, concrete, carbon dark, woodchips, food items and sawdust. The plan of silos to store mass solids includes mass materials, geometry and structural contemplations. By and large the supporting structures are supposed to organize. Here 3 number of silos are mulled over. The structure of silo likewise dependent on the thickness and edge of inward erosion of material to be put away. In past, analysts have contemplated the shear conduct of Silo. the model utilized for the nonlinear time history analysis Considers. In this work Study on Silos for Safe Storage of Food Grain Using STAAD Pro V8i Software,

Comparison of Grain Storage Silo with Different Height (Silo of different tallness for example 12m, 16 m, 20m) in Seismic Zone III Using STAAD-Pro V8i Software. The structural displaying and analysis should be possible utilizing structural programming STADD PRO v8i. The structural analysis should be possible utilizing FEM technique. For this structure, not just thinking about the vertical powers (Dead burden and live burden) yet additionally considering the laterals powers like breeze load and Seismic burdens for structural analysis and configuration Reinforced solid silos are normally utilized structures for enormous storage of various materials.

Riya Dey etal., in the article "Wind and Earthquake impact on R.C.C and Steel Structure", says that the standard target of this undertaking is to correlation among RCC and Steel Structure and plan a multistoried structure utilizing STAAD Pro. The plan includes load estimations and dissecting the entire structure by STAAD Pro. The structure techniques utilized in STAAD Pro analysis are Limit State Design adjusting to Indian Standard Code of Practice. The Thesis includes STAAD Modeling, Analysis the individuals because of the impact of Wind and Seismic burden and Compare them for a 35 meter tallness Building with Concrete and Steel development. The proposition structure is a 10 celebrated structure with 3.50 m as the tallness of each floor. The general arrangement measurement of the structure is 30.0 m x 20.0m.

Krishna T. Kharjule etal.,in the paper "Seismic analysis of R.C.C. what's more, Steel Silos", expresses that Structures utilized for putting away mass solids are called containers, bunkers, silos, or tanks. There is no commonly acknowledged definition for these terms, shallow structures containing coal, squashed stone, rock, and comparative materials are called canisters or bunkers and tall structures containing materials, for example, grain, concrete and wheat are typically called silos. Raised silos for the most part comprise of a cone shaped rooftop, a tube shaped shell and a cone shaped hopper and they could be raised and bolstered by outlines or fortified solid segments. Round silos (both steel and strengthened cement) are utilized to store material in different industries like concrete plants (clinkers), power plants(crude coal), oil and gas industry (sulfur pellets) and so forth. Raised steel and fortified solid roundabout silo for storage show executionin earthquake strengthened solid silo solidness increments by utilizing shear divider however loss of steel silo in earthquake dependability builds utilizing steel board on inverse side Displacement of structure diminishes if there should be an occurrence of shear divider board and firmness increments.

AshwiniBidari etal., in the article "Analysis of Seismic and Wind Effect on Steel Silo Supporting Structures", outlines that India's financial development is dependent upon the development of the Indian steel industry. Utilization of steel is taken to be a pointer of monetary turn of events. In steel plants, steel silos are utilized for the storage of mass materials. Be that as it may, steel silos contrast essentially from their solid partners in physical properties like the high quality per unit weight and flexibility. The high return and extreme quality outcome in slim areas. Being pliable the steel structures give adequate guidance ahead of time before disappointment by method of inordinate disfigurements. Steel silo is raised and bolstered by outlines. This paper portrays the analysis and plan of skyscraper steel building outline with supported and without propped under impact of wind and earthquake utilizing SAP2000 and furthermore to look at the reaction of propped and unbraced structure which exposed to level or sidelong stacking framework. Dynamic analysis is completed by utilizing Equivalent Static technique and Response range strategy for earthquake zone V according to Indian code.The outcomes as far as Natural period, Design Base shear, sidelong Displacements are thought about for the diverse silo supporting models considered in the current examination. The

supported framework gives the efficient outcomes contrasted with unbraced framework as far as recurrence and uprooting.

NateghiAlahi F etal., in the paper, "Numerical examination concerning seismic conduct of fortified solid silos thinking about granular material-structure association", enunciated that the impact of granular material-structure connection is researched for a strengthened solid silo by utilizing ABAQUS limited component bundle. A hypoplastic constitutive model is utilized for demonstrating the granular material. Subsequent to displaying the granular material-structure collaboration under seismic excitation, the outcomes got are contrasted and those of models without granular material-structure communication.

F. Nateghietal., in the journal "Seismic Behavior of Reinforced Concrete Silos Considering Granular Material-Structure Interaction", expressed that silos are structures that are utilized for putting away various kinds of granular materials. Because of nonlinearity of fortified solid dividers of silo and steadily nonlinear conduct of granular material, by and large seismic conduct of strengthened solid silos is mind boggling, in this paper we have utilized ABAQUS limited component bundle for demonstrating of earthquake impact on a strengthened solid silo, strengthened solid silo dividers are displayed by shell components and their nonlinear conduct is considered by concrete harmed pliancy model, seismic conduct of granular material inside silo is profoundly nonlinear and requires a complex nonlinear depiction of the granular material,

the conduct of granular material is gradually nonlinear even at low strains. The hypo versatility hypothesis depicts the pressure rate as a component of stress, strain rate and void proportion. It can demonstrate the nonlinear and inelastic conduct of granular materials because of its rate-type definition. Granular material inside silo is displayed by strong components and its nonlinear conduct is considered with a hypoplastic constitutive model, for demonstrating of communication between silo dividers and granular material, surface to surface contact with coulomb rubbing law is considered between silo dividers and granular material. In the wake of displaying, the conduct of fortified solid silo under earthquake excitation is contrasted and a model without thinking about granular material-structure association.

F. Nateghi etal., in the paper "Seismic conduct of Silos with various tallness to distance across proportions thinking about granular material structure cooperation", expressed that Silos are structures that are utilized for putting away various kinds of granular material. Dynamic conduct of silos under seismic burdens is exceptionally unpredictable. In this paper seismic conduct of steel silos with various stature to width proportions is explored by considering granular material-structure cooperation utilizing ABAQUS limited component bundle. Silo divider is displayed by shell components and its conduct is viewed as flexible, seismic conduct of granular material inside silo is exceptionally nonlinear and requires a complex nonlinear portrayal of the granular material. The hypoplasticity hypothesis portrays the pressure rate as a component of stress, strain rate and void proportion. The granular material is demonstrated by strong components and its conduct is considered with a hypoplastic constitutive model, for displaying of association between silo divider and granular material, surface to surface contact with coulomb grinding law is considered between silo divider and granular material. The outcomes show that the seismic conduct of silos is subject to the stature to measurement proportion of the silo. While considering a steady an incentive for the dispersion of increasing speed in the stature of silo prompts traditionalist plan pressures for a squat silo dependent on Eurocode 8, this supposition that isn't moderate for a slim silo.

Muhammad UmairSaleem etal., in the periodical "A Simplified Approach for Analysis and Design of Reinforced Concrete Circular Silos and Bunkers", communicated that Reinforced solid silos and bunkers are generally utilized structures for huge storage of various materials. These structures are exceptionally weak when exposed to serious seismic powers. Accessible rules for analysis and plan of these structures require uncommon structure abilities and code systems. The current investigation is planned to expand the structure techniques from various sources to a bound together strategy, which can be applied to a bigger class of strengthened solid silos. In this examination, analysis and structure methods are summed up and introduced in a disentangled structure to ensure the effective down to earth plan uses of strengthened solid silos. Four unique instances of silo configuration dependent on the sort and weight of put away material were considered for the investigation. For each case, the silo was planned utilizing given structure technique and displayed utilizing FEM-based PC bundle. The entirety of the strengthened solid silos were exposed to gravity, wind and seismic powers. In the wake of playing out the analysis and structure of various silos, the bowing second, shear power and hub powers profiles were given for an example silo. The outcomes got from the proposed plan strategy were contrasted and FEM values for various segments of silos, for example, piece, divider and hopper.

Chirag L. Korat et.al., in the journal, "A Review on Parametric Study of Circular RCC Silo having Hopper Bottom", indicated that Looking to the quick speed of advancement that will be dealt with by

proficient architects and globalization of expert administrations to be concentrated, it gets essential to assess them in the zone of plan for modern structures, which has a wide range to be managed. Silo is one of the storage structure which is required for modern plants to store different sorts of materials, for example, concrete, coal, grains, and so on. Consequently it is important to judge in regards to the plan techniques for such structures, which incorporates the investigation of codal provisions prompting analysis and plan alongside specifying of the equivalent. There are numerous silo created in India for storage of concrete which might be transiently or for all time. Be that as it may, presently a day there are required space and monetary structure of enormous size silo. The current investigation is the progression toward the path to give significant specialized data, delineating the hypothetical foundation and codal provisions alongside detail structure strategy with different h/d proportion of silo for same limit of storage and utilization of STAAD-PRO programming for the analysis and plan of different segments of roundabout silo and give practical structure of silo.

Other than the previously mentioned written works the codal provisions are followed for the brief structure

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IS 875 (part 2) – 1987 - code of practice for design loads (other than earthquake) for buildings and structures – imposed loads.

IS 875 (part iii) – 1987: code of practice for design loads (other than earthquake) for buildings and structures – wind load.

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CONCLUSION

RCC hopper is less cost than the Steel Hopper. While considering the different variables like imperviousness to fire, strength, quote, fix and restoration RCC hopper is better contrasted with steel hopper. Despite the fact that RCC hoppers are more steady and tough than Steel Hopper its dead weight is more than steel hopper. Therefore the Steel hoppers are anything but difficult to move and transport. Subsequently dependent on the site conditions, stacking, wind and earthquake boundaries, and monetary conditions and so on, hoppers can be introduced appropriately.

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