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Application of IoT Framework for Prediction of Heart Disease using Machine Learning

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Abstract— Prognosis of illnesses is a difficult problem these days throughout the globe. Elder people of twenty years and over are taken into consideration to be laid low with this sickness now a days. For example, human beings having HbA1c level more than 6.5% are diagnosed as infected with diabetic diseases. This paper uses IoT to evaluate threat factors which have been similar to heart diseases which are not treated properly. Diagnosis, prevention of heart disease may be done by use of machine learning (ML). There has been an extensive disconnect among Machine Learning architects, health care researchers, patients and physicians in their technology. This paper intends to perform an in-intensity evaluation on Machine Learning to make us of new advance technologies. Latest advances within the development of IoT implanted devices and other medicine delivery gadgets, disease diagnostic methods and other medical research have considerably helped human beings diagnosed heart diseases. New soft computing models can be helpful for remedy of various heart diseases. The Food and Drug Administration (FDA) employs several particularly creative thoughts to get their capsules to the client. Artificial Neural Community offers a first-rate chance to deal with heart diseases with advance IoT and cloud applications.

Keywords-*IoT, Machine Learning, GPS, Human to Machine Interaction, NBM, RF,LMT,DT.*

I. INTRODUCTION

IoT is shaping the way we live our lives. Today IoT is being used extensively to lessen the burden on humans. It is a vision to connect all devices with the power of internet always learning and always growing. It is a non-standard computing device connected wirelessly to network and has ability to transmit data. We use it in several sectors like health sector, farming home automation, industry etc. Example in healthcare industry it helps to detect the equipment and also patient asset such as wheelchairs, available of ventilators etc. any equipment with IoT sensor then it can track easily. Mainly two types of IoT devices are planted inside the physical objects they are either switch (that sends command to things) or a sensor (that collect and send data elsewhere). It transmits and receives data over wireless network with limited human intervention, real time data collect and analysis, no need of Human to Human (H2H)[1] and Human to Machine (H2M)[1] interaction.

IoT collects data using gateway or other edge devices. IoT connected devices communicate via network on cloud-based platforms connected to the Internet of Things [2]. In a forecast nearly 10 billion IoT devices are used till 2020 that increases up to 30 billion by 2030.

1.1. IoT Layered Architecture:

Internet of Things is wide variety of applications and use `IoT increase rapidly growing. Due to different types of application used for different devices so there is no fixed standard define architecture. Architecture are designed based on functionality and implementation of required sector. Here with fig.1 we will discuss about some basic architecture i.e. 4 stage architectures in below image 4 layer clearly present and divided as follows.

1. Application layer
2. Data processing layer
3. Network layer
4. Sensing layer

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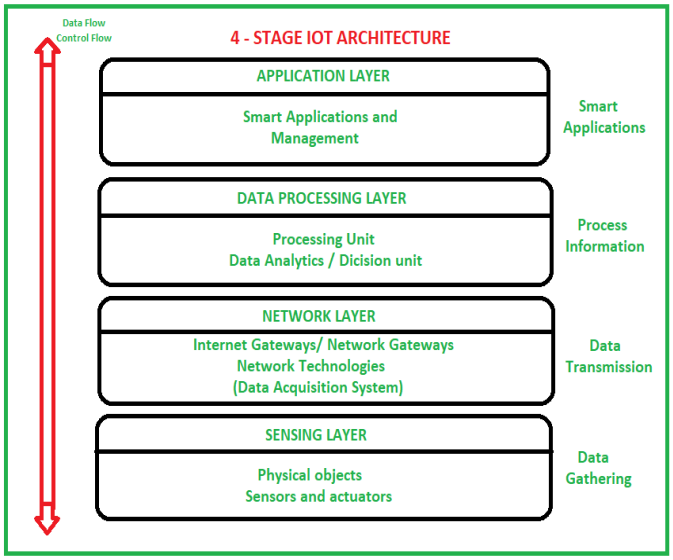

Figure –1: IoT architecture

a. **Sensing layer**: It collect data and process them and emit data overNetwork.

b. **Network layer**: Here DAS (Data Acquisition System) are present which work is collecting data and aggregating data then converting analog data of sensor to digital data. It is basically connection between sensor network and internet perform many basic gateways function like malware protection and filtering some time decision making and data management service.

c. **Data processing layer**: In data processing layer data are analyze and preprocess before sending to the data center / cloud where data are access by software application for data monitoring and manage and further use.

d. **Application layer**: It is the 4th stage of IoT architecture where storage data in data center or cloud are used by end user application like agriculture, health care, defense, industry, etc.

1.2. Common IoT Devices for Health Care Application:

Healthcare sector [3] represents one of the fastest growing sector of the IoT market. In-fact the value of this sector which is sometimes called the Internet of Medical Things (IoMT).To understand how IoT devices are work and monitor in healthcare industry, there are multiple way IoT devices are worked in healthcare example remote patient monitoring i.e. Smart device like sensors in IoT collect data from patient like body temperature, heartbeat, sugar level etc.

Healthcare Monitoring Devices:

There are several types of sensor implant devices in which IoT collects actual data which helps in to monitor patient health status and treatment. In bellow we will discuss some IoT sensor devices.

i. Mood Supervision: In last few decades there is more emphasis given to mental health. Mood tracking device are used to track the mood or emotion of individual person. The device supervise that the mood is good or in stress and give possible suggestion for take good decision.

ii. Smart watch monitoring: Now days, It is commonly used device by peoples. In smart watch there are several applications are stored by which it can monitor pulse rate, showing heartbeat, echocardiogram and many more reminder given. All these things are shown in connected phones in form of graphs and tables.

iii. Robotic surgery: These devices must be small enough to perform surgery with minimal disruption. Less blood lose, shorter hospital stay and quicker hospital recovery. There are several robotic surgeries like Prostate Surgery, robotic kidney surgery, robotic colorectal surgery, single site robotic gallbladder surgery and many more.

iv. Ingestible Sensor: The main work of this device is to collect data from human body for example it collects information from digestive and other systems in a much less invasive way. It provides picture of stomach that (we called laparoscopy), measure PH level of stomach and also help to find the internal bleed point.

Similarly many healthcare devices are remote patient monitoring, Hand hygiene monitoring, Parkinson's disease monitoring, connected inhalers, connected control lasers and many more which helps IoT health care system.

1.3. IoT Applications in Medical Sector

IoT architecture may additionally overcome bottleneck based on the muse of facts orientated method. IoT devices with excessive performance and reliability operate for data exchange. There are several middleware that are present for replacing and comfortable statistics however some facts are time-honored and rejected at time of accessing from statistics hub. A few technology such as Representative State Transfer [REST], Application Program Interface [API], Message Queuing Telemetry Transport [MQTT], Constrained Application Protocols [CoAP], Data Distribution Services[DDS]. For real time system, Extensible Message and Presence Protocols [XMPPs], Advanced Message Queuing Protocol [AMQP], Simple Object Access Protocols [SOAPs] and The Java Message Service [JMS]are popular and easy deployable.

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1.4. Performance Evaluation

Data collect and stored in data hub, aIoT device used by a human, that collect the data and send to hub using edge computing which collect and analyze data by the help of SDN and store in cloud. In between data collect and send to cloud there is a chance of data miss or data lose so for security purpose back chain protocols are work. It authenticates data and help to store appropriate data. After analyze and decision taken by SDN device have to retrieve data from cloud to perform, if there any issue in cloud for server down are connection lose a fog computing is used. Which store the cached data for that device do not wait for server reply and perform work. Inside device two major IoTplants one is switch which command and another is sensor which perform task. In sensor section 2 type of protocol used one is MQTT that send and receive message and alert the user and another is CoAP which work is communication established between nodes.

1.5. Cloud service and it's various benefits in healthcare

By using integrating cloud computing in fitness care service can extensively improve and may lead to several opportunities for medical area. Many medical service offerings can be improved via integration of cloud of IoT.For example series of affected person data through sensor moving sensed data to cloud for processing and storing. By analyzing the stored data at cloud and we can take appropriate action [2].

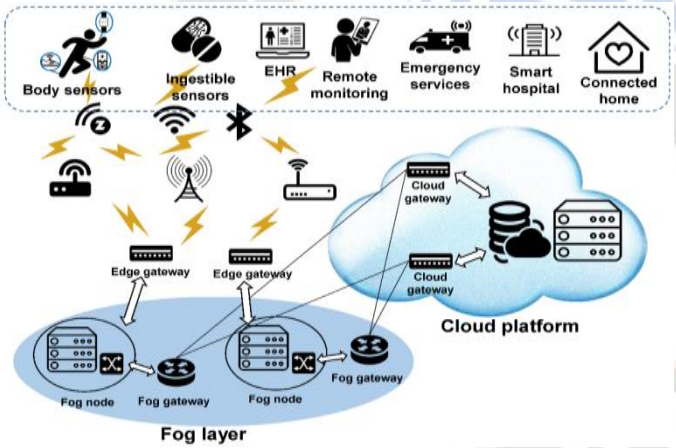

Figure – 2: Cloud Service in Health Care

1.5.1. Computation capabilities**:** Due to limited processing capabilities IoT device does not processing sensed data at device site. So it transferred data to a dedicated cloud for real time processing and analysis. The dedicated cloud provide infrastructure as per requirements or demand. If connection between devices is unreliable MQTT in IoT uses QoS (Quality of Service) level to ensure guarantee delivery of message to receiver.

1.5.2. Storage Capabilities: Every time large amount of unstructured data are continuously produce IoT device can't store the big data due to limited storage capacity. It takes advantages of cloud. Edge computing and storage is the best example in current interest. Edge computing is the simple enough to store and process near wherein they may be produced the wished data. Imposing this system requires, that processing potential be put in location near the edge, however additionally garage infrastructure.

1.5.3. Communication: Communication amongst these gadgets required hardware that can be very expansive. Cloud can offer an expenses effective solution to manage and join those IoT gadgets from everywhere and any time by the usage of diverse software programs. In healthcare basically Zigbee is used for collecting and shifting various monitoring data about affected person. In preference to Bluetooth and RFID, Zigbee device can transmit data over lengthy distance by means of passing data through a mess network of intermediate device to attain greater distance one.

1.5.4. Scope: Day by Day capability inside the IoT device are delivered in healthcare utility that will increase new type of information, risk and opportunities. So cloud may be very value effective and most appropriate answer to handle the bid data which is generated by means of IoT that in addition to creates the possibility for data integration, data exchange and analysis. Therefore there are many motivating thing encourage the combination of IoT and cloud computing in health application.

1.6. IoT Architecture for Health Care Application:

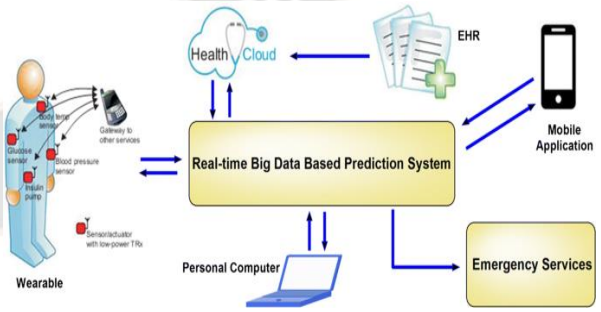

Figure – 3: Cloud Service in Health Care

Like traditional methods to collecting the data or symptoms to predict disease, now a day's IoT is helping to collect data from patients through its sensors to predict diseases. The Internet of Things (IoT) is a network of physical objects and other products that are equipped with electronics, intelligent clothes, software and apps, sensors, and network connectivity in order to gather and share data with one another or with data centre systems. Because wearable health monitors are readily

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available in many homes, the data produced by these devices is huge in volume and random in nature, necessitating analysis with a big data analytics system in order to comprehend user behavioral patterns or extract the necessary information. Health-related IoT technology will account for 40% of all IoT-related technology by 2020. By lowering inefficiencies, containing costs, and saving lives, the fusion of medicine and information technology, such as medical informatics, will revolutionize healthcare as we currently know it. In the event of a medical emergency like heart disease, diabetes, or many other chronic conditions, real-time monitoring via IoT can save lives. There are several sources accessible today that track health indicators regularly. The suggested system's workflow with various data sources is shown in Figure 3.

This paper comprises of the following areas. The literature review makes a study of the different work done in the field of medical science by use of soft computing techniques and IoT applications by different authors. The architecture part elaborates the design of layers in IoT for quick and correct data transmission from patient to cloud to enhance the speed of treatment of the patients. Also, various IoT devises and cloud services are discussed for the purpose of the health care applications. The methodology part describes the dataset parameters used for the detection of heart disease whether the parameters lead to stroke or not. The different machine learning models are explained with their usefulness for prediction of heart disease in patients. The analysis part makes the comparison of different machine learning models by using the different parameters like accuracy, Mean Absolute Error(MAE), Root Mean Squared Error(RMSE), Root Relative Squared Error(RRSE) and Relative Absolute Error(RAE).

II. LITERATURE REVIEW

IoT consist of resources constrained smart devices capable to sense and process data. It connects huge number of smart sensing devices. IoT technology categorized into three groups namely Identification Technology, Communication Technology, Location Technology. Identification technology identify the nodes that present in healthcare network, the devices communicate in limited are network and establish wide communication using Zigbee, wi-fi, RFID among different entity and track location using Global Positioning System (GPS) in] Some sensor either embedded or wearable on human body are used to collect physiological information such as temperature, pressure rate and so on from patient body. It helps healthcare professions and patients deals with various health issues at a reduce cost. Health monitoring of patient with chronic disease such as cardiovascular disease using wearable ECG [4]. For analysis discrete wavelet transform (DWT) [5] are used to store and retrieve data built an analog based framework to categorized general purpose data to medical domain Data storage and accelerate plays an important role in the IoT system as a large amount of data are acquired from variety of sources. If due to any cause the data hub is slow at that time a FOG computing [6] work which acts like a cache memory hold temporally used and needed data. Data processed and cache in that many consumers can retrieve data easily. To access that data from cloud IoT device have to authenticate, it authenticate by edge service provide light weight authentication scheme. It also improving the communication and computation speed of the devices and load balancing achieved and also extend cloud computing.

In IoT for storage purpose collected data by devices are send to edge server, Edge server are connected with SDN (Software Define Network) controller which performs load balancing, network optimization and efficient resource utilized. Renetet al.[7] discusses about SDN which helps to simplify the control and management of next generation data. At the time of processing data there is chance of data lose for that Back chain based system provide powerful security in Secure storage by using back chain it securely stored not only human data but also the vital inter and intra control signaling and other crucial information including task-respective information and decision making result should also be secured to ensure to the security of entire system.

Saminathanet al.[8] conducted a research regarding any wearable devices which are used in human body basically in that there are two types of protocol used one is CoAP which establish connection between many to many models. And another is MQTT,it is a technology that based on an asynchronous messaging protocol, which decouple the message sender and receiver in both space and time. When it used in a personal health device it sends alert message to the caretaker, by whichimmediate action can take if any abnormal behavior detected by device.

Tazinet et. al.[9] conducted a research about brain stroke which is a potentially fatal medical condition that needs to be treated right away to prevent future consequences. The creation of a machine learning (ML) model could help with stroke early diagnosis and subsequent reduction of its severe repercussions. In their study, they examine how well different machine learning (ML) algorithms predict stroke based on various physiological factors. They found with a classification accuracy of 96%, random forest classification exceeds the other investigated techniques. Finally they have found, the random forest method performs better than other methods when forecasting brain strokes using cross-validation measures.

According to Dritsas et al.[10], stroke poses a threat to a person's life and should be avoided and/or treated to prevent unanticipated complications. Today, with the quick development of AI/ML, clinical providers, medical specialists,

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and decision-makers can take advantage of the existing models to find the most pertinent features (or, alternatively, risk factors) for the occurrence of strokes and can evaluate the corresponding likelihood or risk. In this regard, machine learning can assist in the early diagnosis of stroke and lessen its severe aftereffects. Here author examines the efficacy of multiple ML algorithms to determine the best reliable algorithm for stroke prediction based on a number of variables that capture the profiles of the participants. The models' interpretation and the classifiers' classification performance are mainly supported by the performance evaluation of the classifiers using AUC, F-measure, and accuracy. Additionally, Authors demonstrate the models' reliability and prognostication power for the stroke class. With an AUC of 98.9%, F-measure, precision, recall, and accuracy of 98%, stacking classification performs better than the other approaches. Consequently, a stacking method is an effective strategy for identifying people who are at a high risk of having a stroke in the long run. The final result of this study is the AUC values demonstrate that the model is highly predictive and capable of differentiating between the two classes.

Harshitha et al.[11] states that, by using graphs, charts, and other visuals to highlight key, common trends and information, professionals can help even a data analyst grasp the dataset. Therefore, data visualization was their primary goal. Used tools like pandas, matplotlib, seaborn, and pywaffle for aesthetically pleasing and instructive data visualization. One prevalent trend in business intelligence is predictive analytics. It assists clinicians in quickly making data-driven judgments that can potentially forecast and stop fatal diseases. Here authors have effectively used categorical feature analysis, numerical feature analysis, and multi co-linearity. Here authors implement the data set on five different models like Random Forest, Logistic Regression, K Nearest Neighbor, Decision Tree and Support Vector Machine. They have conducted a comparison analysis is base on their accuracy and they found Random forest is providing best result as compared to other four models.

Shraddha et. al.[12] conducted a research on the complexity of stroke diagnosis and prognosis, which depends on various clinical and personal factors, makes it challenging. To enhance diagnostic and prognostic accuracy, comprehensive data collection and assimilation are crucial. It is important for clinicians to understand the intended use and limitations of ML algorithms like SVM, DLT to avoid misinterpretation of data due to the "black box" nature of these algorithms. The main aim of this authors study is to find out missing data from the collected data set.

Asokanet et. al.[13]outlines a strategy for enhancing the services offered in the healthcare industry for patient monitoring and wellbeing. This system uses a number of sensors to sense the patient's surroundings and situations, which are then processed to determine the patient's conditions of existence. The medical personnel can make improvements to the current conditions and ensure that patient conditions are monitored accurately even when they are not present by collecting and analyzing this data.

Panwar et al. [14] presented a deep learning architecture called PP-Net for estimating HR and BP (DBP, SBP) simultaneously from a single channel of PPG data. The acquired results for the estimation of DBP, SBP, and HR concurrently on a wider population with CVD complications, with an average NMAE of 0.059 and NRMSE of 0.090 andcorrelation coefficients of 0.9902, demonstrate the effectiveness of the suggested model in widespread healthcare monitoring. The suggested PP-Net framework's multi-score output capability offers a less complex answer than the current techniques, which have evaluated HR and BP using various methodologies and neural models. Additionally, the suggested model performed data-driven feature extraction during training, doing away with the separately executed, less expensive phases of feature selection and extraction. Additionally, PP-Net is a lightweight (low-complex) model that offers numerous in-one solutions in a discrete manner using a sensor, enabling a financially advantageous, safer, and practical means of health monitoring in/outside of clinical settings.

Jayasingh et al. [15] have demonstrated a novel approach for data classification using neural network. They have described the different soft computing models which are helpful for data classification.Jayasingh et al. [16] have made the smart weather prediction using different machine learning techniques. Jayasingh et al. [17] have explained weather prediction using hybrid soft computing models and it is observed that the hybrid models outperform the traditional soft computing models in terms of accuracy and error parameters. Prusty et al. [18] have explained the SMS fraud detection using machine learning.Jayasingh et al. [19] have made a comparison between J48 Decision Tree, SVM and MLP in weather forecasting and concluded that SVM performs the best among all the four different soft computing models under consideration. Mantri et al. [20] have demonstrated the use of soft computing techniques for weather change predictions in Delhi. Swain et al. [21] have demonstrated A Non-small Cell Lung Cancer Detection Technique Using PET/ CT Images. Swain et al. [22] have explained a hybrid learning method for distinguishing lung adenocarcinoma and squamous cell carcinoma.

III. METHODOLOGY

The health data for the parameters like heart disease or attack, high BP, high cholesterol, Cholesterol check, BMI, Physical activity, Heavy alcohol consumption, General Health, Mental Health, Physical Health, Different Walk, Sex, Age,

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Education, Income, Smoker Fruits, Veggies, any health care of 25,000 patients are collected from the Kaggle data set to make use of the machine learning models like Naïve Bayes Multinomial (NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) to predict the Stroke possibility of a concerned patient. Out of these data's, some data like heart disease or attack, high BP, high cholesterol, Cholesterol check, BMI, Physical activity, Heavy alcohol consumption, General Health, Mental Health, Physical Health, Different Walk are collected through IoT Sensor and the data's like Education, Income, Smoker Fruits, Veggies, any health care are collected through traditional method.

- Heart Disease or Attack: A heart Disease is also known as a myocardial dead tissue and happens when a portion of the heart muscle doesn't get sufficient blood.
- High BP: High blood Pressure is also known as hypertension. Higher blood pressure may cause for the heart assault or stroke.
- High Cholesterol: High cholesterol could be a condition in which you've got as well numerous lipids (fats) in your blood. It is also known as hypercholesterolemia.
- Cholesterol check: A fully cholesterol Check is done to decide whether your cholesterol is high and to assess your hazard of heart assaults and other shapes of heart malady.
- BMI: It is a medical tool which measures the ratio of a individuals height based on his weight to calculate the level of body fat he has.
- Smoker: It defines a person who is addicted towards smoke.
- Physical Activity: Physical Activity is representing as any substantial development created by skeletal muscles that requires vitality consumption.
- Fruits: A fruit is a delicate, thick portion of a blossoming plant that contains seeds. It is shaped from the ovaries of angiosperms and is select as it were to this gather of plants. It contains a large verity of vitamins which takes a huge role on controlling different body diseases.
- Veggies: It representing a person who takes only vegetable with avoiding Non-Veg items for maintaining a healthy life style.
- Heavy Alcohol Consumption: This parameter shows the level of Alcohol Consumption of a patient.
- Any Health Care: This parameter representing the patients who is taking any type of Health care advantages in daily life.
- General Health: This parameter shows the overall health conditions of a patient.
- Mental Health: This parameter shows the mental health conditions of a patient.
- Physical Health: This parameter representing the physical fitness and activeness of a patient.
- Diff Walk: This is showing the status of daily walking of a patient.
- Sex: This is representing the gender of a patient.
- Age: This is representing the age of a patient.
- Education: This parameter is representing the education of a patient by Boolean value.
- Income: This parameter shows the patients income variants with a Boolean value.

3.1. Naïve Bayes Multinomial (NBM): In order to achieve cutting-edge accuracy, model size, and throughput, Naïve Bayes Multinomial (NBM) is a suitable multi-class classification technique to solve the prediction problems.

3.2. Random Forest (RF):Leo Breiman and Adele Cutler are the creators of the widely used machine learning technique known as random forest, which mixes the output of various decision trees to produce a single outcome.

3.3. Logistic Model Tree (LMT): Logistic Model Tree (LMT) may be a classification model which shows with a related administered preparing calculation by inter-mixing the factors of Logistic Regression (LR) with the parameters of Decision tree learning.

3.4. Decision Tree (DT): Decision Tree is the non-parametric supervised learning approach which can be used for classification and regression problems. This is one organized hierarchy which has a root node and other features of a tree to classify the problems.

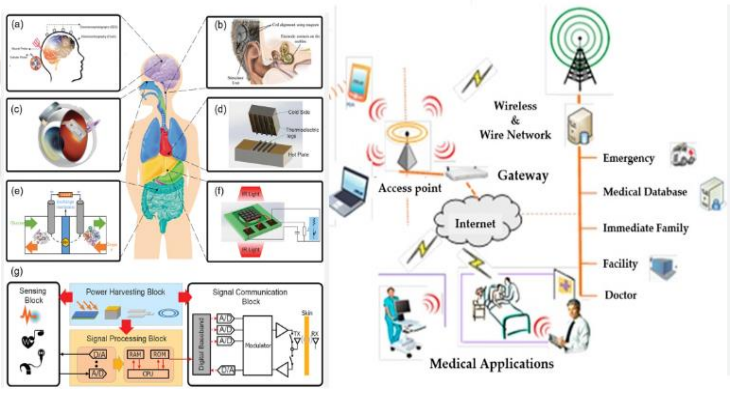

Figure – 4: Proposed Model for IoT in Health Care

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IV. ANALYSIS

The proposed model uses the implant devices inside several of human body to collect the time series data of different parameters for the diseases inside the human body. The collected data are stored in cloud to be used for analysis by different machine learning techniques like Naïve Bayes Multinomial (NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) to predict the heart disease attack in advance so that optimum care of human body can be taken. The parameter selection is done as per the requirement in different machine learning models[15] so that the prediction of diseases can be done with more accuracy and less error.

Table - 1: Comparison Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Accuracy

Accuracy	NBM	RF	LMT	DT
1-10K	80.646	94.46	94.54	94.62
10K-20K	82.07	95.89	95.95	95.99
20K-30K	80.96	94.44	94.54	94.54
30K-40K	83.13	93.83	96.93	96.93
40K-50K	85.38	96.56	96.62	96.62

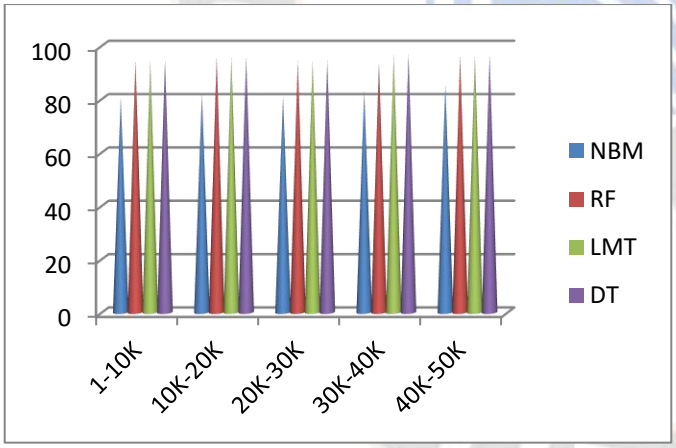

Figure - 5: Graphical Comparison Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Accuracy

Table - 2: Comparison of Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Mean Absolute Error(MAE)

MAE	NBM	LMT	RF	DT
1-5k	0.201	0.33	0.097	0.101
5-10k	0.179	0.414	0.076	0.077
10-15k	0.189	0.459	0.101	0.103
15-20k	0.17	0.5	0.059	0.059
20-25k	0.147	0.41	0.065	0.065

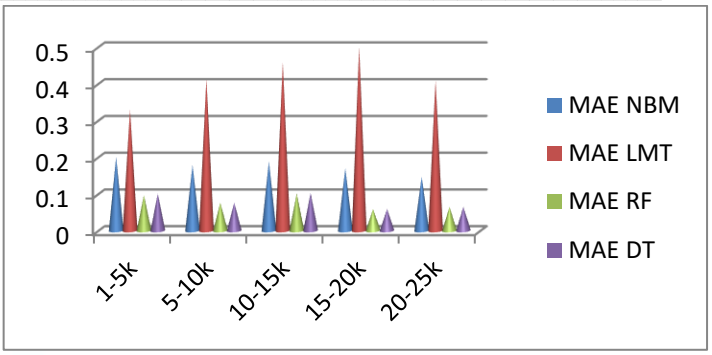

Figure - 6: Graphical Comparison Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Mean Absolute Error(MAE)

Table - 3: Comparison of Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Root Mean Squared Error(RMSE)

RMSE	NBM	LMT	RF	DT
1-5k	0.434	0.41	0.219	0.225
5-10k	0.413	0.455	0.195	0.196
10-15k	0.422	0.479	0.227	0.227
15-20k	0.397	0.5	0.172	0.172
20-25k	0.369	0.454	0.181	0.18

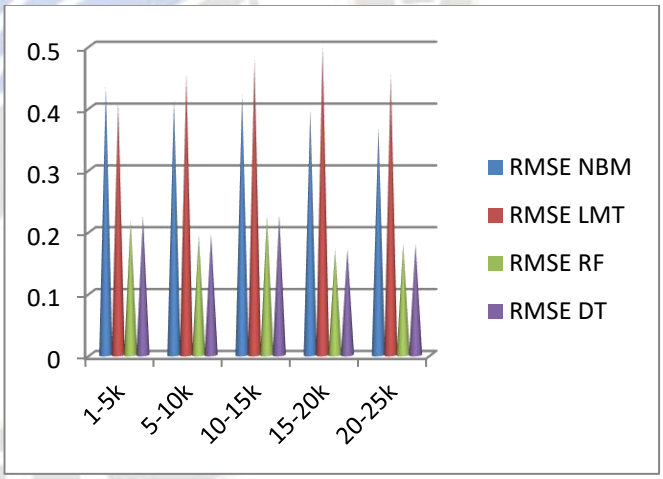

Figure - 7: Graphical Comparison Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Root Mean Squared Error(RMSE)

Table - 4: Comparison of Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Relative absolute error (RAE)

RAE	NBM	LMT	RF	DT
1-5k	197.57	330.49	95.58	99.97
5-10k	233.6	537.91	99.2	100.01
10-15k	183.6	444.38	98.02	100.01
15-20k	286.21	839.84	99.08	100.01
20-25k	225.47	629.39	100.13	100.01

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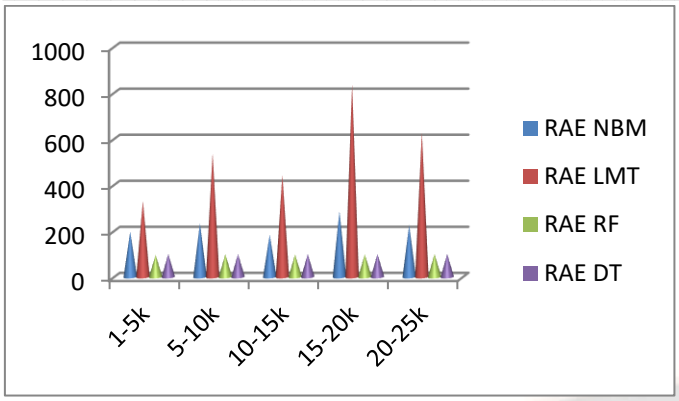

Figure - 8: Graphical Comparison Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Relative absolute error (RAE)

Table - 5: Comparison of Naïve Bayes Multinomial(NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Root Relative Squared Error (RRSE)

RRSE	NBM	LMT	RF	DT
1-5k	192.41	181.89	97.26	100
5-10k	210.84	232.31	99.83	100
10-15k	185.96	211.01	99.92	100
15-20k	230.78	290.27	99.93	100
20-25k	204.36	251.34	100.31	100

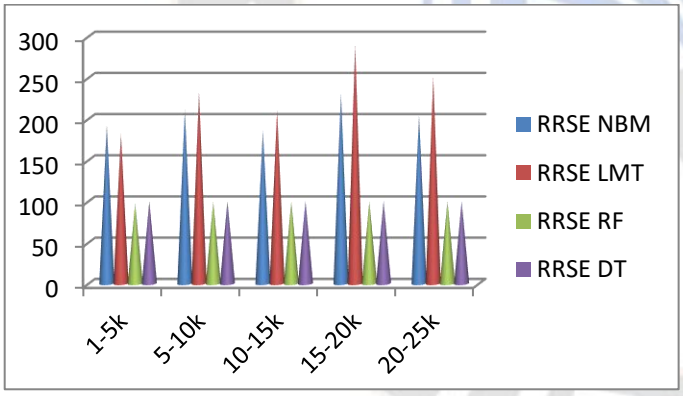

Figure - 9: Graphical Comparison Naïve Bayes Multinomial (NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) on the basis of Root Relative Squared Error (RRSE)

The prediction in different models like Naïve Bayes Multinomial (NBM), Random Forest(RF), Logistic Model Tree(LMT) and Decision Tree(DT) are compared on the basis of the accuracy and different error parameters and it is found that Decision Tree(DT) performs the best. So, Random Forest is used to predict the most of the diseases in human body with better accuracy.

V. CONCLUSIONS

In the study of 25,000 patients of heart disease, we have made a comparison of Neural Basis Model (NBM), Random Forest (RF), Logistic Model Tree (LMT) and Decision Tree (DT) to predict the stroke possibility of concerned patients. After analysis of the different models, it is observed that the Decision Tree(DT) performs the best. To make the appropriate diagnosis of heart diseases, the new model will help us in predicting with little prediction error and better accuracy. The new model may use the usefulness of more than one model to make hybrid models by making use of the advantages of individual models which may learn in better way to diagnose and help for treatment.

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