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An IoT Framework for Heart Disease Prediction using Machine Learning

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ABSTRACT: Heart plays significant role in living organisms. Diagnosis and prediction of heart related diseases requires more precision and perfection because a little mistake can cause major problem or death of the person, there are numerous death cases related to heart and their counting is increasing exponentially each day. In order to deal with the problem there is essential need of prediction system for awareness about diseases. Machine learning is the branch of Artificial Intelligence (AI), it provides assist in predicting any kind of event which take training from natural events. In this project, we calculate accuracy of machine learning algorithms for predicting heart disease, for these algorithms are k-nearest neighbour, RandomForest, and support vector machine (SVM) by using UCI repository dataset for training and testing. For implementation of Python programming, we used PyCharm software. The internet of things (IoT) along with wearable monitoring system is a rising technology that is anticipated to contribute an extensive range of healthcare applications. The healthcare industry was fast to adopt the IoT as integrating IoT aspects into medical devices enhance software. The internet of things (IoT) along with wearable monitoring system is a rising technology that is anticipated to contribute an extensive range of healthcare applications. The healthcare industry was fast to adopt the IoT as integrating IoT aspects into medical devices enhance the quality as well as the efficiency of service. This brings remarkable advantage for older people, patients with chronic conditions, and individuals needing stable management.

I. INTRODUCTION

In this paper the mainfocus is on the various data mining practices that are employed in prediction of heart disease. Basically, heart regulates blood flow throughout the body. Non uniformity to heart can cause distress in other parts of the body. Any kind of trouble heart to normal functioning of the body can be classified as a heart disease cause. In today's current world, heart disease is one of the main occurrence of most deaths. Due to unhealthy lifestyle, smoking, alcohol and high intake of fat can cause heart disease , that will cause hypertension. Every single year around the world, according the World Health Organization more than 10 million die due to heart diseases. Good lifestyle and earliest detection are only ways to prevent the heart related diseases. The main challenge in today's healthcare is provision of best quality services and effective exact diagnosis.In recent years, the heart diseases are found as the prime source of death in the world ,but they are also the ones that can be controlled and managed conclusivly. The whole accuracy in management of a disease lies on the correct time of detection of that disease. The proposed work makes an attempt to detect the heart diseases at early stage to avoid harmfulconsequences.The records of large set of medical data created by medical experts are available for examining and extracting valuable knowledge from it. For the Most part the medical database consists of discrete information. Ddecision making using discrete data becomes complecated and difficult task. Machine Learning (ML) which is subfield of data mining handles large scale well-formatted dataset fluently. Machine learning can be used for diagnosis, detection and prediction of various diseases in the medical field. The goal of this paper is to provide a tool for doctors to determine heart disease as early stage. This will help in providing effective treatment to patients and avoid serious consequences. Machine Learning plays a very important role to detect the hidden discrete patterns and there by examine the given data. After analysis of data ML techniques helps in heart disease prediction and early treatment. In thisproject, will present the performance analysis of various ML techniques such as KNN, SVM and Random Forest for predicting heart disease at an early stage. The internet of things (IoT) along with wearable monitoring systems is a rising technology

that is anticipated to contribute an extensive range of healthcare application. Fast to adopt was Healthcare industry in the IoT as integrating IoT aspects into medical devices enhances the quality as well as the efficiency of service. That cause anremarkable advantages for older people, patients with chronic conditions, and individuals needing stable management. The IoT based healthcare applications are utilized to gather essential data, such as real-time changes in health parameters and updates of medical parameter's severity within a standard time interval, therefore IoT devices incessantly generateeenormous amounts of health data. Internet of things is acknowledged as the most crucial future technology and is gaining much attention from healthcare industries. Internet of Thing was revealed to have significant potential in high-risk environment, health, and safety (EHS) industries, where people's lives are at risk and IoTbased applications are primed to present safe, dependable, and effective solutions.TheIoT-based remote health monitoring systems nurse the health of elderly people who do not want to compromise their ease and who prefer to stay at home.

[1].Machine learning algorithm has proven to be the most accurate and reliable algorithm and hence used in the proposed system. Due to the development of different IoT capabilities and instruments to track patient's health conditions regularly, health care monitoring has improved tremendously. The doctor will be interacted with the patient more easily it gives the satisfaction of treatment and it also reduces the hospital stay and healthcare expenses. The primary objective of employing IoT in healthcare system is to set up a fully automated environment for patient monitoring and providing assistance and care to patients in real-time. At home the portable system that can be used by the patient for measuring their ECG profiles and diagnose their disorder in real-time. Therefore, in this paper, an extensive review is carried out to find the existing technologies that are available for monitoring heart related diseases. It is understood from analysis, that the collected raw data contains noise and irrelevant contents. For diagnosis, these are the irrelevant and incorrect data that are not useful. These error and huge variation in data leads to reduction in the classification accuracy, sensitivity and precision. Hence, in this paper a novel pre-processing approach is used to remove noise and unrelated data from ECG signals.

[2].An effective Cloud and IoT based disease diagnosis model has been developed to monitor, predict and diagnose the heart disease. In thisresearch, an productive method is utilized for heart disease is created utilizing the UCI Repository dataset and the healthcare sensors to anticipate the people who suffer from heart disease. Besides, categorized are used to classify the patient data for the identification of heart disease. The categorized algorithm executes the training process which utilizes the heart disease dataset to train the classifier to identify the presence of heart disease or not. After that , the trained classifier is ready to test the incoming patient details to properly identify whether the patient suffers from heart disease.

[3].In Cloud and IoT Software focused on m-healthcare has been developed and adopted to identify the true seriousness degree and to diagnose it according to gravity. The IoT equipment is known as embedded and wearable IoT tools. These instruments are used to obtain information from remote areas surrounding the procedure. It is possible to gather the immediate measurement as restorative information gathered by IoT apps, connected to the human body. Similar type of medicinal information is created by the use of the UCI Repository dataset and the sensors to anticipate the general population that was extremely suffered by diabetes.

[4].we calculate accuracy of machine learning algorithms for predicting heart disease, for this algorithm used are k-nearest neighbour, decision tree, linear regression and support vector machine (SVM) by using UCI repository dataset for training and testing. For implementation of Python programming Anaconda(jupytor) notebook is best tool, which have many types of libraries, header files that make the work more accurate and precise.

[5].This paper eevaluates the detection of heart disorder using machine learning algorithms and python programming. Heart disease is common and dangerous disease caused by fat containment over the post decades. Heart related disease occurs due to over pressure in the human body. We have used different kinds of parameters in the dataset we can predict the cardiac-disease. We have identified a dataset contains of 12 parameters and 70000 individual data values to analyses the performance of patients. Primary objective of the paper is to get a better accuracy to detect the heart-disease using algorithms in which the target output counts that a person having heart disease or not.

Here we will working towards the compactness of whole module so that it can be made into a wearable device. A device which is capable of being worn can be made for remotemonitoring of the patient using more compact sensors. More sensors can be used such as SP02 oxygen sensors and Blood pressure sensor in order to give more accuracy to the predicted data and also increase the scope of the system. Heart disease will be detected without any

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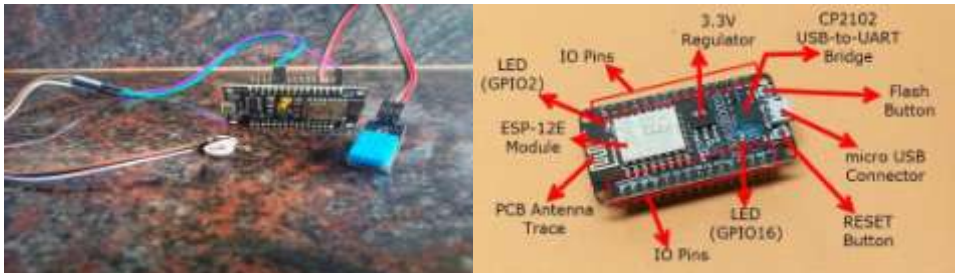
occurrence of symptoms and the integration of clinical decision support with computer-based patient records could reduce medical errors, enhance patient safety, decrease unwanted practice variation, and improve patient outcome. This proposal is assuring as data modelling and analysis tools, e.g., data mining, have the potential to generate a knowledge-rich environment which can help to significantly improve the quality of clinical decision.

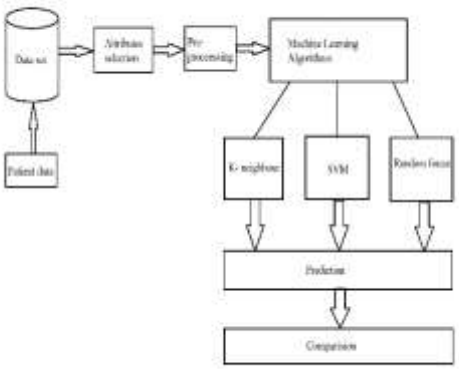
II. CIRCUIT



Hardware connection and Node MCU

An ESP8266 is a microcontroller and is shown in Figure 3.2. The ESP8266 uses a 32-bit processor with 16-bit instructions. Some of the library code and a primary stage boot loader are included in the ESP8266 Read-only memory. Everyremaider of the code must be stored in external Serial flash memory. Node MCU ESP8266 The ESP8266 has 17 GPIO pins but only 11 can be used (among 17 pins, 6 are used for communication with the on-board flash memory chip). It also has an analog input. It also has a Wi-Fi communication to connect ESP8266 to Wi-Fi network, hook up with the web, host a internet server, etc. The outputof

III. METHODOLOGY



Block diagram

This is a Node MCU based heart disease predictionby using Machine Learning and it is the portable IoT system which is designed to work with sensors and microcontrollers. The components that are used are:1.LM35Temperature Sensor 2. LM35 varies, based on the temperature around it. It is a small and cheap IC which may be wont to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or any development platform like Raspberry Pi. The change in the volume of a blood vessel that takes place when the heart pumps blood, and a detector that monitors this volume change is called a pulse sensor. Heart rate can be measured by four ways, electrocardiogram, photoelectric pulse wave, blood pressure measurement, and phonocardiography. Pulse sensors use the photoelectric method. Pulse Sensor 3. Node MCU. The 2 sensors are connected to the Node MCUto collect the body temperature, and heartbeat rate. The most important step in machine learning is pre processing. When dealing with unbalanced datasets, oversampling and under sampling are helpful to balance the samples of two different classes. Dataset used was the Heart disease Dataset, which is a combination of various database, but only the UCI repository dataset was used. The database consists of many attributes but all published experiments refer to using a subset of only fourteen features. Therefore, we have used the already processed UCI repository dataset available in the Kaggle website for our analysis. Fully complete description of the attributes used in the proposed work. The pre-processing technique splits the data set into the training data and test data. The training data is trained and given to the classifier together with the test data. The different reading of the patient's vital signs is gathered and send for testing by the classifier model which are using a dataset for detecting abnormalities. Processing of the system start with the data collection for this we

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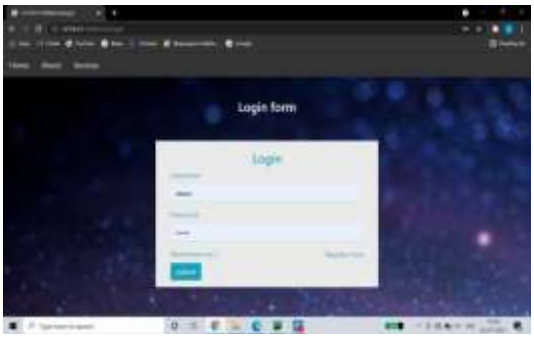
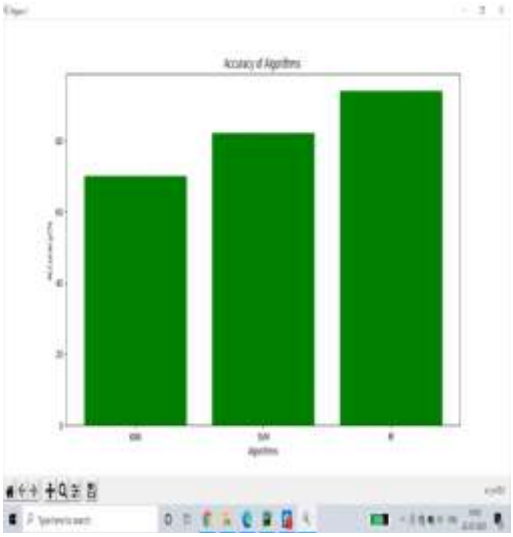
use UCI repository dataset which is well verified by number of researchers and authority of the UCI.
1.Data collection: The method ofdeterminig heart disease carries following procedure: We have collected data from dataset provider –Kaggle.com. The Svetlaana Ulianova published as in the title of Cardiovascular Disease related to dataset.The dataset collected consists of 70,000 records of patient's data carries eleven features and Dataset is the information or tool necessary to do any type of research in a project.
2.Attribute Selection: Attribute of dataset are property of dataset which are used for system and for the heart many attributes are like heart bit rate of person, gender of the person, age of the person and many more.
3. Preprocessing of data: Preprocessing needed for achieving prestigious result from the machine learning algorithms. Cosidering an example, Random Forest algorithm does not support null values dataset and for this we have to manage null values from original raw data. For this project we have to convert some categorized value by dummy value means in the form of "0"and "1".
4. Data Balancing: Data balancing is essential for accurate result because by data balancing graph we can see that both the target classes are equal.

IV. RESULT

The main goal is to predict the accuracy for future problems that the disease may cause and which algorithm can give more accuracy that can be made for the target output predicts that a person having heart disease or not. The imported dataset can be processed and correlated to each other and visualize the correlations for each attribute with another attribute to each other by heap map shows highest correlation for cholesterol and glucose.



After performing the machine learning approach for testing and training we find that accuracy of the Random Forest is much efficient as compare to other algorithms. Accuracy should be calculated with the support of confusion matrix of each algorithm and it is concluded that Random Forest is best among them.



Output of different algorithms

The output from serial monitor will be displayed as shown below.

Serial Monitor output

Telegram bot is designed to send messages to the doctor and family members regarding the bp and temperature of the patient. In case if the reading is abnormal then it will send the notification.

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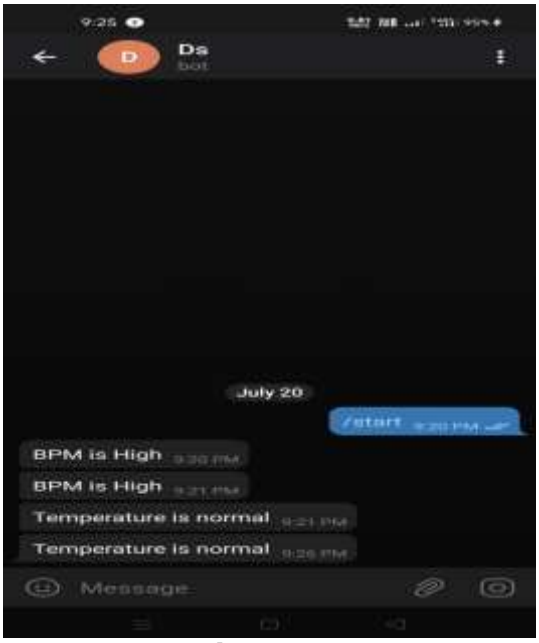

Telegram Bot

CONCLUSION

The Heart disease prediction system is user friendly, scalable, reliable and an expandable system. Prototype can also help in reducing treatment costs by providing Initial diagnostics in time. This model can also serve the purpose of training tool for medical students and will be a soft diagnostic tool available for physician and cardiologist. The general physicians can utilize this tool for initial diagnosis of cardio patients. There are many possible improvements that could be traversed to improve the scalability and accuracy of this prediction system. Thus we have developed a generalized system, in future we can use this system for the different data sets.

ADVANTAGES

1.User can search for doctor's help at any point of time.
2.User can talk about their heart disease and get instant diagnosis.
3.Doctors get more clients online.
4.Very useful in case of emergency.

REFERENCES

[1]. Rajesh N, T Maneesha, Shaik Hafeez, Hari Krishna, "Prediction of Heart Disease Using Machine Learning Algorithms", International Journal of Engineering & Technology, 7 (2.32) (2018) 363-366.

[2]. M. Ganesan and Dr. N. Shivakumar, "IoT based heart disease prediction and Diagnosis model for healthcare using Machine Learning models", Proceeding of International Conference on System Computation Automation and Networking 2019.

[3]. Sunil S. Khatal and Dr. Yogesh Kumar Sharma, "Analyzing the role of Heart Disease prediction system using IoT and Machine Learning", International Journal of Advanced Science and Technology, Vol. 29, No. 9s, (2020), pp. 2340-2346.

[4]. Archna Singh, Rakesh Kumar, "Heart Disease Prediction Using Machine Learning Algorithms", 2020 International Conference on Electrical and Electronics Engineering (ICE3- 2020).

[5]. Chitambaram T, Logesh Kannan N, Gowsalya M, "Heart Disease Detection Using Machine Learning", Advances in Computational Science and Technology ISSN 0973- 6107, Volume 10.