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Heart disease prediction using Advanced Machine Learning Algorithms

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Abstract: It might have happened so many times that you or someone yours need doctors help immediately, but they are not available dueto some reason. The Heart Disease Prediction application is an end user support to the online. Here, we propose a web application that allows users to get instant guidance on their heart disease through an intelligent system online. The application is fed with various details and the heart disease associated with those details. The applications allows user to share their heart related issues. It then processes user specific details to check for various illnesses that could be associated with it. Here we use some intelligent data mining techniques to the mostaccurate that could be associated with patient"s details. Based on result, system automatically shows the result specific doctors for further treatment and the system allows user to view doctor"s details.
Keywords: Decision Tree, Naive Bayes, Logistic Regression, Random Forest, Heart Disease Prediction.

I. INTRODUCTION

In today's contemporary world, heart disease is one of the primary reasons for occurrence of most deaths. Heart disease may occur due to unhealthy lifestyle, smoking, alcohol and high intake of fat which may cause hypertension According to the World Health Organization more than 10 million die due to Heart diseases every single year around the world. A healthylifestyle and earliest detection are only ways to prevent the heart related diseases. The main challenge in today's healthcare is provision of best the main challenge in today's healthcare is provision of best quality services and effective accurate diagnosis ML techniques such as Naive Bayes, Decision Tree, Logistic Regression and Random Forest for predicting heart disease at an early stage ML is an emerging application of AI that uses different analytics and statistical techniques in order to improve the performance of particular machine learning from old data. It enables a particular machine to learn from database and en Hence the performanceby experience. The proposed system used by Doctors that can access the system in order to decide whether the patient having HD or not. This system provides the level of HD presence such as no HD, having HD, and most likely having HD. This system has one admin user that manages and control the overall system and data of doctors and patients reports. this project will solve by two classification algorithms of supervised ML such as DT and NB . This system has one admin user that manages and control the overall system and data of doctors and patients reports.

II. LITERATURE OVERVIEW

A. Heart Disease (HD)

Author: V. Sharma, A. Rasool and G. Hajela.Description:

HD is defined a range of conditions that affect your heart. It is describing any disorder of the heart. The umbrella of HD consists of different type of HD such as blood vessel diseases and heart defects when we're born with congenital heart defects, among others. The term "Heart Disease" is always used interchangeably with the term "Cardiovascular Disease CVD generally refers to conditions that involve blocked or narrowed blood vessels that can lead toa heart attack, stroke or chest pain.

B. Early diagnosis of heart disease using classification and regression treesAuthor: A. M. Amiri and G. Armano.

1) *Description:* Early diagnosis of heart defects are very important for medical treatment. In this paper, we propose an automatic method to segment heart sounds, which applies classification and regression trees. The diagnostic system, designed and implemented for detecting and classifying heart diseases, has been validated with a representative dataset of 116 heart sound signals, taken from healthy and unhealthy medical cases. The ultimate goal of this research is to implement a heart sounds diagnostic system, to be used to help physicians in the auscultation of patients, with the goal of reducing the number of unnecessary echocardiograms and of preventing the release of newborns that are in fact affected by a heart disease. In this study, 99.14% accuracy, 100% sensitivity, and 98.28% specificity were obtained on the dataset used for experiments.

C. *Analysis of data mining techniques for heart disease prediction.Author: M. Sultana, A. Haider and M. S. Uddin.*

1) *Description:* Heart disease is considered as one of the major causes of death throughout the world. It cannot be easily predicted by the medical practitioners as it is a difficult task which demands expertise and higher knowledge for prediction. This paper addresses the issue of prediction of heart disease according to input attributes on the basis of data mining techniques. We have investigated the heart disease prediction using KStar, J48, SMO, Bayes Net and Multilayer Perceptron through Weka software. The performance of these data mining techniques is measured by combining the results of predictive accuracy, ROC curve and AUC value using a standard data set as well as a collected data set. Based on performance factor SMO and Bayes Net techniques show optimum performances than the performances of KStar, Multilayer Perceptron and J48 techniques.

D. *A Survey on Predicting Heart Disease using Data Mining Techniques. Author: Cincy Raju, E Philipsy, Siji Chacko , L Padma Suresh , S Deepa Rajan.Description:*

Heart disease is a most harmful one that will cause death. It has a serious long term disability. This disease attacks a person so instantly. Medical data is still information rich but knowledge poor. Therefore diagnosing patients correctly on the basis of time is an exigent function for medical support. An invalid diagnosis done by the hospital leads for losing reputation. The precise diagnosis of heart disease is the dominant biomedical issue. The motivation of this paper is to develop an efficacious treatment using data mining techniques that can help remedial situations. Further data mining classification algorithms like decision trees, neural networks, Bayesian classifiers, Support vector machines, Association Rule, K- nearest neighbour classification are used to diagnosis the heart diseases. Among these algorithms Support Vector Machine (SVM) gives best result.

E. *Heart Disease Prediction Using Hybrid Genetic Fuzzy Model.Author: Santhanam T, Ephzibah E-P.*

1) *Description:* The objective of the work is to diagnose heart disease using computing techniques like genetic algorithm and fuzzy logic. The system would help the doctors to automate heart disease diagnosis and to enhance the medical care. In this paper a hybrid genetic- fuzzy heart disease diagnosis system is designed. The genetic algorithm is used for a stochastic search that provides the optimal solution to the feature selection problem. The relevant features selected from the dataset help the diagnosing system to develop a classification model using fuzzy inference system.

III. SYSTEM ARCHITECTURE

The proposed system is a web-based application that runs on the browser. This system is embodied in a web application. The web application architecture of the HDPS is to define the communication between applications, and database on the web. It represents the relationship between them and visualizes how they work together System design is the systematic process of defining the components of the purposed system that consists of model, architecture, and interface of different elements.

It describes the operation of a system that demonstrates data flow structure and a link between the database tables In this system design, we are going to design a procedure programming system design related to our project.

This application can be used by all patients or their family members who need help in emergency, Useful in case of emergency, Predict nearest disease.
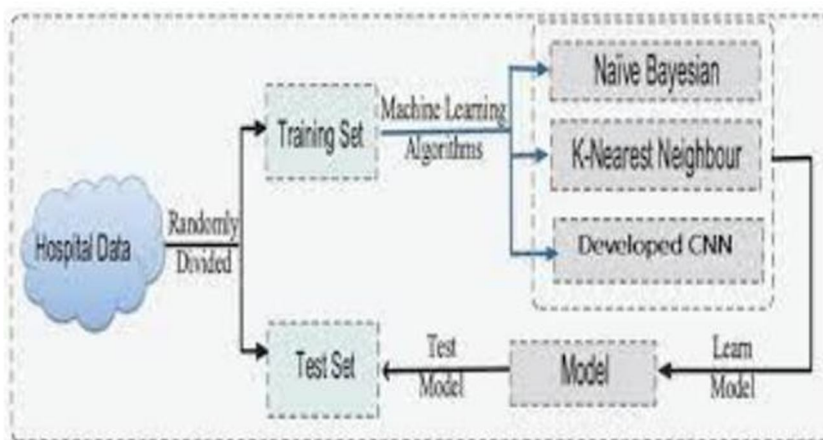
A. *Proposed Heart Disease Prediction of mode*

1) *Doctor and Patient Registration:* We have designed the first page of Heart Disease Prediction using the Machine learning system registration to Doctors and Patients. In these System, we firstly provide a registration service to doctors and patients with their Name, Adhar-Card number and Password.

2) *Validate the Enter Information as USER Id:* We validate the registration with user-id should be 2 digit number means only valid Adhar card number should enter. If we enter the number less than 12 it will give an alert message that "User Id Should be 12 digit". We can't keep the field empty it will give an alert message that "User Id field cannot be kept empty.

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5) *Doctor and Patient Login:* If the Doctor and Patient is registered and accessing the application a second time then we are providinga login service to them. After Clicking on the Login services they will go to another login page and they will login with the valid User id and password.

6) *Doctor and Patient Wrong Login Credentials:* In these, if we enter the wrong login credentials as wrong user id and password it will give an error message.This is validated for both users.(Doctors and Patients).

7) After the successful Doctor login, we are providing services to the doctor is that "View Training data " means which data filled by a patient and provide Report Generation service in that According to data Doctor will generate a report for the particular patient.

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IV. DATA FLOW DIAGRAM

A data flow diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing. A DFD shows what kind of information will be input to and output from the system, how the data will advance through the system, and where the data will be stored.
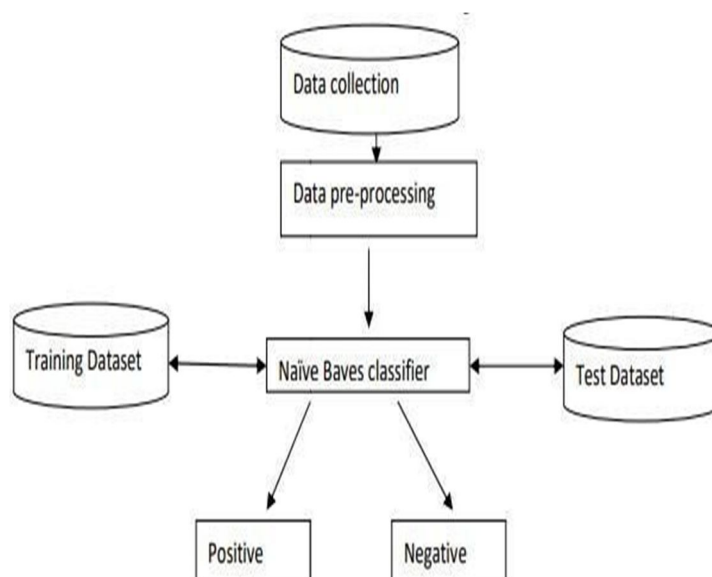
V. CONCLUSIONS

In these we study the comparative performances of different supervised machine learning algorithms in disease prediction. Since clinical data and research scope varies widely between disease prediction studies, a comparison was only possible when a common benchmark on the dataset and scope is established. Therefore, we only chose studies that implemented multiple machine learning methods on the same data and disease prediction for comparison. Regardless of the variations on frequency and performances, the results show the potential of these families of algorithms in the disease prediction

VI. ACKNOWLEDGMENT

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