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Heart Disease Prediction Using Supervised Machine Learning Algorithms

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***Abstract*—Predicting and detecting cardiac disease has always been a difficult and time-consuming undertaking for doctors. To treat cardiac disorders, hospitals and other clinics are giving costly therapies and operations. As a result, anticipating cardiac disease in its early stages will be beneficial to people all around the world, allowing them to take required treatment before it becomes serious. Heart disease has been a major issue in recent years, with the primary causes being excessive alcohol use, tobacco use, and a lack of physical activity. Machine learning methods are utilized to forecast cardiac illnesses in this article. For training and testing, a data collection containing diverse human health parameters is used. Many AI&ML algorithms are used to predict cardiac disorders. The performance of the machine learning algorithm is compared after it has been implemented.**

Keywords—Artificial Intelligence, Machine learning, health care services, heart disease prediction.

I. INTRODUCTION

Heart is the most important organ of the human body. Heart diseases are the main cause of so many deaths in the world now a days. Heart is responsible for pumping of blood in human cells. Without the functioning of the heart no one can live. Heart diseases refer to all kind of diseases that affect the working of the heart. There are a lot of types of heart diseases in the world. Coronary artery diseases CAD is a type of most common disease in human hearts. Heart failure HF is also most common type of heart disease. HF is main cause of so many deaths now a days.

The blocking in coronary arteries is the main cause of CAD diseases. The blood moves through coronary arteries and circulates through all human body. According to a survey, more than 26 million [3] people are suffering from CAD diseases in the world. In 2005, more than 17.5 million people died in the world because of CAD diseases. There is an increase of about 2% in CAD diseases throughout [4] the world.

There are many reasons of heart diseases in human body. There are mainly two types of risk factors which are responsible for heart diseases. One category of factors is including those factors which cannot be controlled such as family history, human age and gender. Another category includes those factors which are responsible for heart diseases and can be controlled. Risk factors such as smoking habits can be controlled. The heart diseases can be detected by many ways and angiography is the most common way to detect heart diseases. However, the angiography method has several disadvantages. This is an expensive operation, and doctors must consider many factors when diagnosing patients, which makes the doctor's job extremely difficult. These shortcomings encourage researchers to develop a non-invasive method for predicting heart disease. So, there is a need to develop an automated system that can detect heart diseases on the basis of various human medical factors. In this work the power we predict heart diseases on the basis of various factors. The following section describes a review of the literature on predicting heart disease.

II. LITERATURE SURVEY

Fahd Saleh Alotaibi [1] work on heart diseases and made a model for prediction of heart diseases. S.Nandhini et al. [2] apply machine learning algorithms for prediction of heart diseases. Sanjay Kumar Sen [3] uses popular classifiers to predict and diagnose heart disease, including Nave Bayes, SVM, Decision Tree, and K-Nearest Neighbour. A review on machine learning models for early diagnosis of heart disorders was proposed by R. Katarya and P. Srinivas [4]. The study concludes that machine learning can be used to detect cardiac problems. A model for predicting cardiac disease was proposed by A. Gavhane et al. [5]. M. Kavitha et al. [6] proposed a new model for predicting cardiac disease. P. Sujatha and K. Mahalakshmi [7] evaluate the power of machine learning algorithm for prediction of heart diseases.

P. S. Kohli and S. Arora [8] also apply ML algorithms in heart diseases prediction. Ed-Daoudy and K. Maalmi apply big data approach for early detection of heart diseases. Erdoğan and S. Güney works on heart diseases prediction using AI and machine learning techniques. Lakshmanarao et al. also worked on heart failures and their reasons. S. Farzana and D. Veeraiah make a dynamic model for prediction of heart diseases using multi machine learning techniques. S. K. J. and G. S. and R. Atallah and A. Al-Mousa also develop a model for detection and prediction of heart diseases. R. Wijaya et al. applied machine learning and neural networks to develop a system for prediction and detection of heart diseases. Author conclude that Neural Networks improves the performance of ML algorithms in prediction of heart diseases. Following a review of the literature, it is clear that more research is needed in this area. The intended work in this approach is discussed in the next section.

III. PROPOSED WORK

Recognizing the preparation of raw health-care diseases must be early detected. ML systems are used to analyze raw data and provide a different and fresh perspective on cardiac disease. In the restorative profession, the heart disease outlook is both challenging and significant. To do heart disease

prediction, we used python and pandas activities. The dataset for forecasting heart illness that we used comes from Kaggle. In the restorative profession, the heart disease outlook is both challenging and significant. To do heart disease prediction, we used python and pandas activities. The dataset for forecasting heart illness that we used comes from Kaggle.

The suggested system is depicted in the diagram below. Figure 1 depicts the suggested approach for predicting cardiac disease using machine learning techniques.

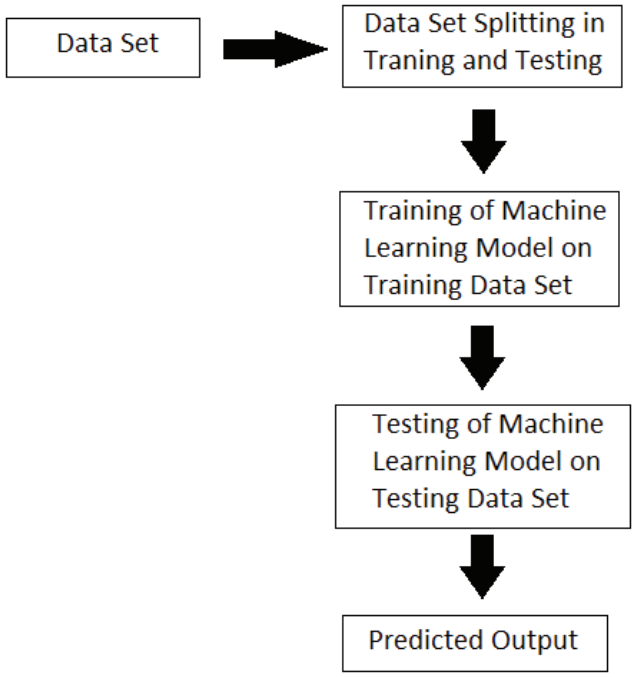

Fig. 1. Proposed model for heart disease prediction

In this proposed work, the information set is to begin with partitioned into preparing and testing information sets. At that point the ML models are prepared on the preparing information set. At that point the execution of the ML models is tried on the testing information set. At last, the execution of ML models is calculated on the premise of the rate of testing information it approves correctly. This proposed work is actualized in python programming dialect and the another area talk about the comes about and examination of this work.

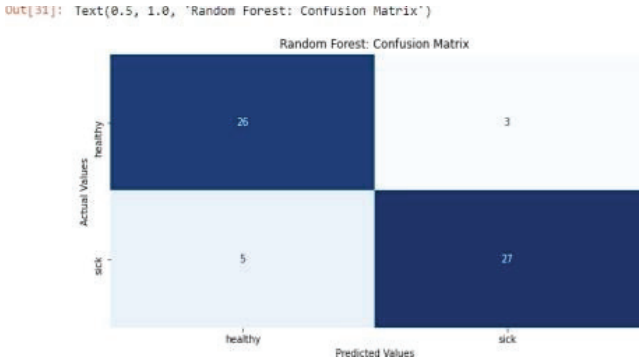

Fig. 2. Confusion matrix of Random Forest

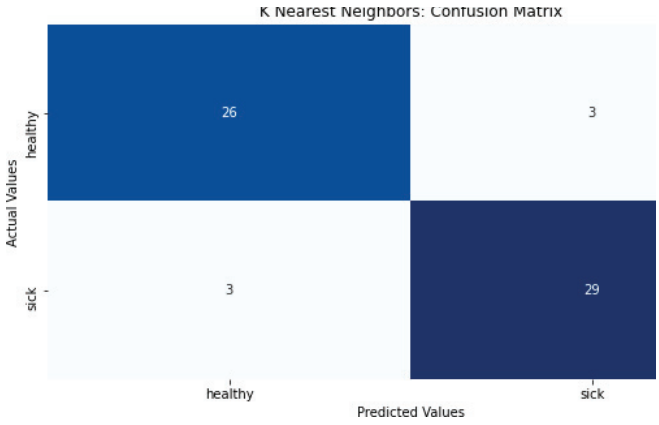

Fig. 3. Confusion matrix of K-NN

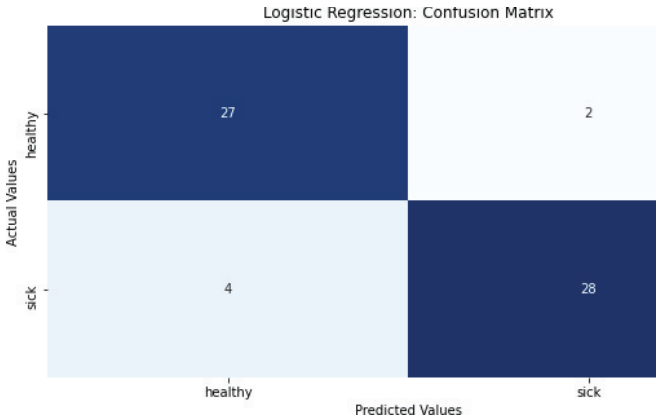

Fig. 4. Confusion matrix of Logistic Regression

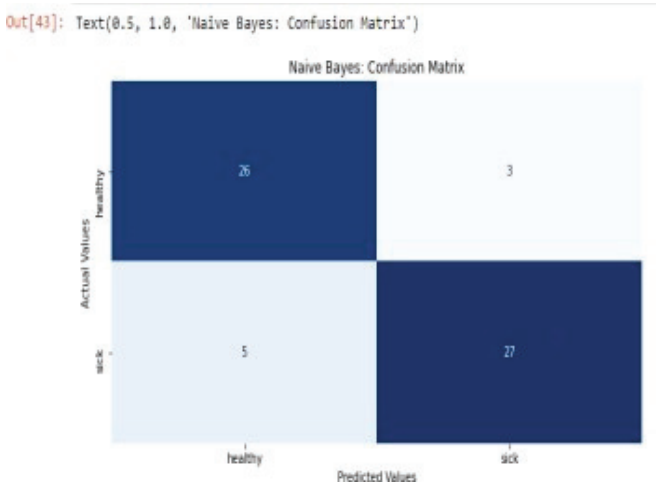

Fig. 5. Confusion matrix of Naïve Bayes

Table 1 is showing the performance of machine learning models.

The next section discusses the conclusion and future scope of this paper.

IV. RESULT AND ANALYSIS

This section shows how four machine learning algorithms were applied to a data set to predict heart disease.

Figure 3, figure 4 and figure 5 are showing the confusion matrix of RF, KNN, LR and NB machine learningmodels.

V. CONCLUSION AND FUTURE SCOPE

Four machine learning models KNN, NB, LR and RF are used to predict the heart diseases in human body on the basis of some medical parameters. LR algorithms is best among four which is 90.2%. In future other ML models can be used to predict heart diseases.

TABLE I. PREDICTION ACCURACY

Sr. No.	Type of model	Prediction Accuracy
1	K NearestNeighbour	82.0%
2	Naïve Bayes	86.9%
3	Random Forest	86.9%
4	LogisticRegression	90.2%

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