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Heart Disease Prediction using Neural Network

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Abstract: ***Heart is the next major organ comparing to brain which has more priority in Human body. It pumps the blood and supplies to all organs of the whole body. Prediction of occurrences of heart diseases in medical field is significant work. Data analytics is useful for prediction from more information and it helps medical Centre to predict of various disease. Huge amount of patient related data is maintained on monthly basis. The stored data can be useful for source of predicting the occurrence of future disease. Some of the data mining and machine learning techniques are used to predict the heart disease, such as Decision tree, Fuzzy Logic, K-Nearest Neighbor (KNN), Naïve Bayes and Support Vector Machine (SVM). This paper provides an insight of the existing algorithms and implements hybrid algorithms to improve accuracy significantly.***
Keywords: Machine Learning, Data Mining, CVD (Cardio Vascular Disease), Neural Network.

I. INTRODUCTION

Nowadays, people are getting caught in their day-to-day lives doing their work and other things and ignoring their health. Due to this hectic life and ignorance towards their health, the number of people getting sick increases every day.Most of the people are suffering from a disease like heart disease. Global deaths of almost 31% population are due to heart-related disease as data contributed by the World Health Organization (WHO). Heart Disease which is also known as Cardio vascular Disease consists of various conditions that impact the heart and is the primary basis of death worldwide.

A. Causes of Heart Disease:

The exact cause of CVD isn't clear but there are lots of things that can increase your risk of getting it there are called risk factors.

B. High Blood Pressure

High blood pressure or hypertension is one of the most important risk factors for CVD if you are blood pressure is too high it can damage your blood vessels

C. Smoking

Smoking and other tobacco use is also significant factor for CVD the harmful substances in tobacco can damage and narrow your blood vessels high cholesterol is a fatty substance found in blood if you have high cholesterol it can cause blood vessels to narrow and increase your risk of developing a blood clot.

D. Diabetes

Diabetes is a lifelong condition that causes your blood sugar level to become too high blood sugar levels can damage blood vessels and making them more likely to become narrowed inactivity if you don't exercise regularly it's more likely that you will have high blood pressure high cholesterol levels and overweight all these are risk factors for cardiovascular diseases

E. Family History

If you have a family history of CVD your risk of developing it is also increased you are considered to have a family history of CVD if either your father or brother were diagnosed with CBD before they were 55 your mother or sister where diagnosed with CBD before they were 65 other risk factors other risk factors that affect your risk of developing CVD include age gender diet.
Age- CVD is most common in people or 50 and your risk of developing it increases as your get older
Gender- gender main is more likely to develop CVD at an earlier age than women diet
Diet- an unhealthy diet can lead to high cholesterol and high blood pressure alcohol excessive alcohol consumption can also increase your cholesterol and blood pressure levels and contribute to weight gain

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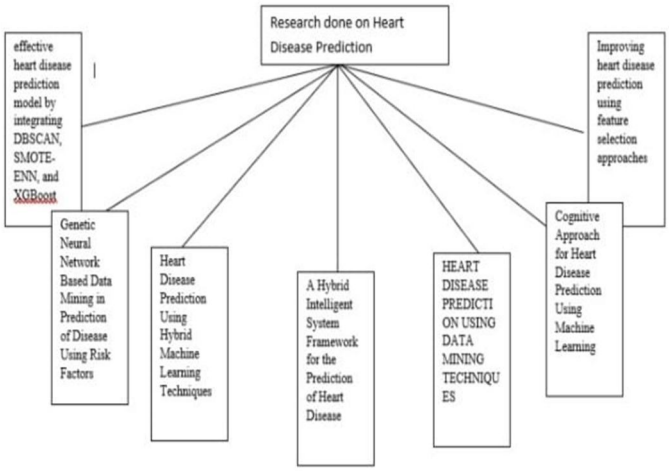


Fig. 1 Research done on Heart Disease Prediction

II. LITERATURE SURVEY

A. "HDPM and effective heart disease prediction model for a clinical decision support system"

In this paper they have proposed an effective heart disease prediction model by integrating DBSCAN, SMOTE-ENN, and XGBoost based machine learning algorithm to improve the prediction accuracy. The DBSCAN detect and remove the outlier data. They used SMOTE-ENN to balance the unbalanced training dataset. And the XGBoost machine learning algorithm was used to generate the prediction model. Analysis study with different outlier detection methods should be done.

B. "Improving heart disease prediction using feature selection approaches"

The main task they did in this paper is to increase the efficiency of algorithms used in heart disease prediction by using feature selection techniques. They used dataset from open source database repository called UCI repository. They have used rapid miner for analysis of the data. Minimum Redundancy Maximum Relevance Feature
Selection (MRMR), this feature selection is being used by them. The different data mining techniques that they have used are Decision Tree, Logistic regression, Logistic regression SVM, Naive Bayes and Random forest. They compared results with the past datasets and achieved the desired result

C. "Genetic Neural Network Based Data Mining in Prediction of Disease Using Risk Factors"

They have used data mining techniques in this study on the data provided on the website American Heart Association.

they have studied 11 attributes. In this study a new hybrid model of Neural Networks and Genetic Algorithm to optimize the connection of ANN to improve the performance of the Artificial Neural Network. Training accuracy 96.2% ad validation accuracy 89%. They were able to achieve the accuracy of 89%.

D. "Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques"

In this paper they have used Cleveland data and R studio rattle. The system they have used is a combination of characteristics of Random Forest and linear model. They didn't mention the accuracy they have achieved. They have repeated the feature selection for the various combinations of ml algorithms. They have selected the features based on the DT entropy, classification of modeling performance.

E. "A Hybrid Intelligent System Framework for the Prediction of Heart Disease Using Machine Learning Algorithms"

In this paper they have analyzed the Cleveland heart disease dataset 2016. For the feature selection they have used Relief, MRMR, and LASSO algorithms. they have used machine learning classifiers logistic regression, K-NN, ANN, SVM, DT, and NB in the system. The logistic regression with 10-fold cross-validation showed best accuracy 89% when it is used with FS algorithm Relief. This study shows that the feature selection algorithm with classification increases the accuracy as well as the execution time.

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F. "Enhance Deep Learning Assisted Convolutional Neural Network for Heart Disease Prediction on the Internet of Medical Things Platform"

Reported the enhanced deep learning assisted Convolutional Neural Network Learning Prediction Models and Classification. The enhanced deep learning prediction models and classification has been constructed with a deep multilayer perception equipped to create a secure and improved classification model with non-linear functions and linear, regularization, and falling and binary sigmoid classifications utilizing dedicated learning technologies. Feature selection techniques could be used to enhance the prediction

G. "Disease Identification Method Using Machine Learning Classification in Healthcare"

In this work they have used UCI data and used majority voting Ensemble method that combined multiple machine learning techniques in order to provide more accurate results. The four models were Stochastic Gradient Descent (SGD) classifier, K-Nearest Neighbor Classifier, Random Forest Classifier and Logistic Regression Classifier. The voting when each model makes prediction and the output prediction is the one that receives half of the votes.

H. "Heart disease prediction using data mining techniques"

In this work they have selected thirteen vital clinical options, i.e., age, sex, pain sort, trestbps, cholesterol, abstinence glucose, resting ECG, easy lay pulse rate, exercise iatrogenic angina, old peak, slope, variety of vessels colored, and thal. They developed cardiopathy predict system (HDPS) that generates prediction results victimization artificial KNN, Decision Tree, Naive mathematician Classification techniques.

In this paper they have used three different data mining techniques namely – Decision Tree, Naïve Bayes and KNN.

In this work three data mining classification techniques were applied namely Decision trees, Naive Bayes & KNN. From results it has been seen that KNN provides accurate results as compare to Decision trees & Naive Bayes.

I. "Heart Disease Prediction Using Machine Learning Algorithms"

In this paper they have calculated the accuracy of four different machine learning approaches and on the basis of calculation they have concluded that which one is best among them on working the UCI data. (decision tree, linear regression, K-Neighbor, SVM).

this work conclude that the logistic regression gives the accuracy of 87.1%, support vector machine gives the accuracy of 85.71%, Adaboost classifier give the accuracy up to 98.57% which is good for predication point of view.

After they performed the machine learning approach for testing and training they found that accuracy of the KNN is much efficient as compare to other algorithms which is 87%.

The result shows that the KNN is the best algorithm among all the algorithms mentioned.

J. "Heart Disease Identification Method Using Machine Learning Classification in E-Healthcare"

In this paper they used machine learning classifiers such as Linear Regression, KNN, ANN, SVM, Naive Bayes and Decision tree for the designing of the system. They used selection algorithms like MRMR, LASSO, LLBFS and proposed novel selection algorithm like FCMIM. The logistic Regression had 91% accuracy and the processing time was best in features selected by FCMIM, LASSO, relief and LLBFS FS algorithm. ANN classifier was best in Relief FS algorithm in terms of specificity compared to the specificity of MRMR, LASSO, LLBFS, and FCMIM feature selection algorithm.

K. "Cognitive Approach for Heart Disease Prediction Using Machine Learning"

In this paper, they have proposed a machine learning framework to predict heart disease The framework is executed using five algorithms Random Forest, Naïve Bayes, Support Vector Machine, Hoeffding Decision Tree, and Logistic Model Tree (LMT).

III.CONCLUSIONS

In this paper we have studied most of the main papers related prediction of heart disease using machine learning. We concluded that Data Mining is the most widely used technique for prediction heart disease. Some researchers used hybrid techniques to increase the accuracy of prediction. Accuracy of the algorithms in machine learning depends upon the dataset that used for training and testing purpose. When we perform the analysis of algorithms on the basis of dataset. For the Future Scope more machine learning approach

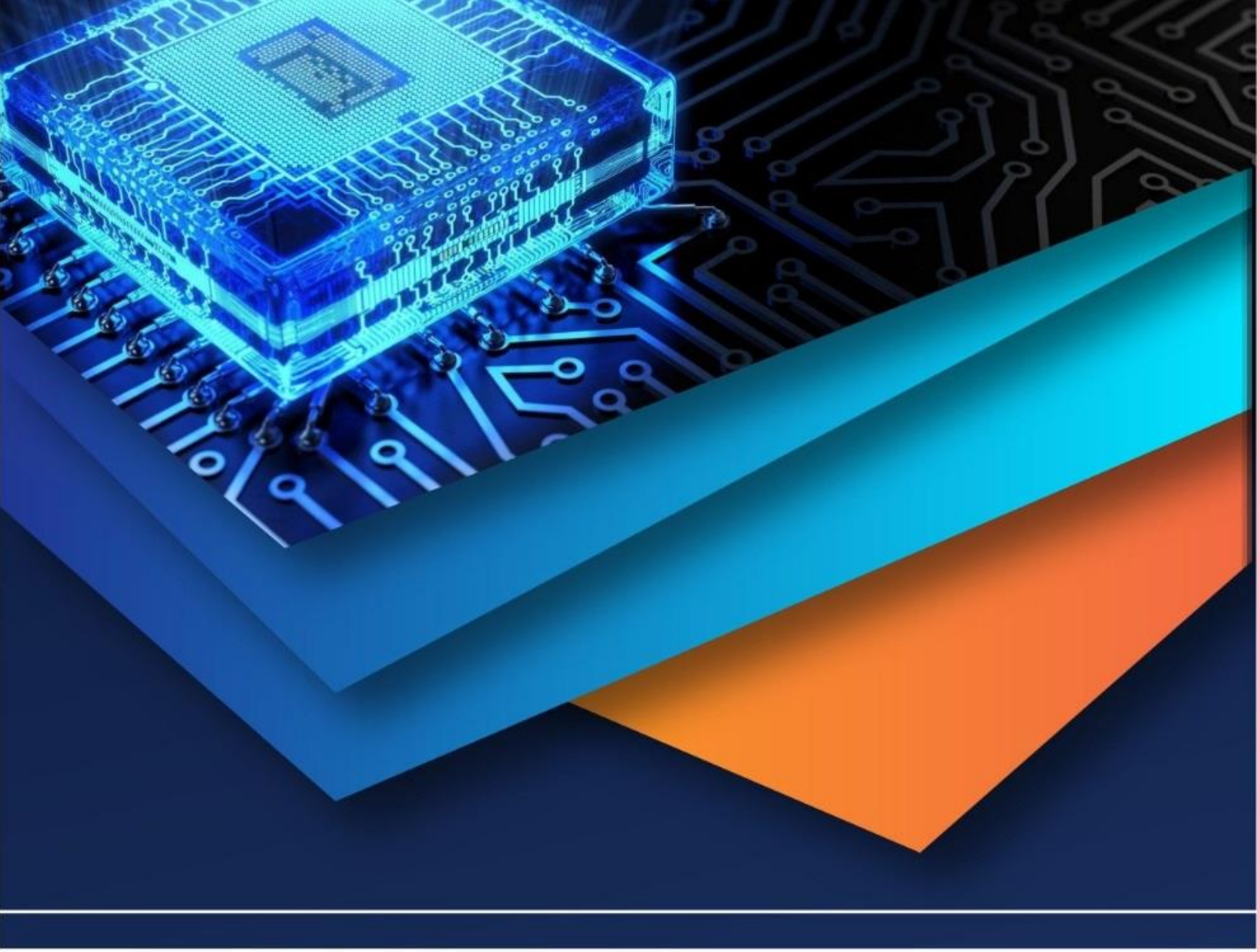
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will be used for best analysis of the heart diseases and for earlier prediction of diseases so that the rate of the death cases can be minimized by the awareness about the diseases.

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