Heart Disease – EDA & Prediction

PROJECT SYNOPSIS

of

Project-I

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C.S.E.

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Introduction

According to the World Health Organization, every year 12 million deaths occur worldwide due to Heart Disease. Heart disease is one of the biggest causes of morbidity and mortality among the population of the world. Prediction of cardiovascular disease is regarded as one of the most important subjects in the section of data analysis. The load of cardiovascular disease is rapidly increasing all over the world from the past few years. Many researches have been conducted in attempt to pinpoint the most influential factors of heart disease as well as accurately predict the overall risk. Heart Disease is even highlighted as a silent killer which leads to the death of the person without obvious symptoms. The early diagnosis of heart disease plays a vital role in making decisions on lifestyle changes in high-risk patients and in turn reduces the complications.

Machine learning proves to be effective in assisting in making decisions and predictions from the large quantity of data produced by the health care industry. This project aims to predict future Heart Disease by analyzing data of patients which classifies whether they have heart disease or not using machine-learning algorithm. Machine Learning techniques can be a boon in this regard. Even though heart disease can occur in different forms, there is a common set of core risk factors that influence whether someone will ultimately be at risk for heart disease or not. By collecting the data from various sources, classifying them under suitable headings & finally analysing to extract the desired data we can say that this technique can be very well adapted to do the prediction of heart disease.

Literature Review

With growing development in the field of medical science alongside machine learning various experiments and researches has been carried out in these recent years releasing the relevant significant papers.

[1] Purushottam ,et ,al proposed a paper "Efficient Heart Disease Prediction System" using hill climbing and decision tree algorithms .They used Cleveland dataset and pre-processing of data is performed before using classification algorithms. The Knowledge Extraction is done based on Evolutionary Learning (KEEL), an opensource data mining tool that fills the missing values in the data set. A decision tree follows top-down order. For each actual node selected by hill-climbing algorithm a node is selected by a test at each level. The parameters and their values used are confidence. Its minimum confidence value is 0.25. The accuracy of the system is about 86.7%.

[2] Santhana Krishnan. J,et ,al proposed a paper "Prediction of Heart Disease Using Machine Learning Algorithms" using decision tree and Naive Bayes algorithm for prediction of heart disease. In decision tree algorithm the tree is built using certain conditions which gives True or False decisions. The algorithms like SVM, KNN are results based on vertical or horizontal split conditions depends on dependent variables. But decision tree for a tree like structure having root node, leaves and branches base on the decision made in each of tree Decision tree also help in the understating the importance of the attributes in the dataset. They have also used Cleveland data set. Dataset splits in 70% training and 30% testing by using some methods. This algorithm gives 91% accuracy. The second algorithm is Naive Bayes, which is used for classification. It can handle complicated, nonlinear, dependent data so it is found suitable for heart disease dataset as this dataset is also complicated, dependent and nonlinear in nature. This algorithm gives an 87% accuracy.

[3] Sonam Nikhar et al proposed paper " Prediction of Heart Disease Using Machine Learning Algorithms" their research gives point to point explanation of Naïve Bayes and decision tree classifier that are used especially in the prediction of Heart Disease. 3 Some analysis has been led to think about the execution of

prescient data mining strategy on the same dataset, and the result decided that Decision Tree has highest accuracy than Bayesian classifier.

[4] Aditi Gavhane et al proposed a paper "Prediction of Heart Disease Using Machine Learning", in which training and testing of dataset is performed by using neural network algorithm multi-layer perceptron. In this algorithm there will be one input layer and one output layer and one or more layers are hidden layers between these two input and output layers. Through hidden layers each input node is connected to output layer. This connection is assigned with some random weights. The other input is called bias which is assigned with weight based on requirement the connection between the nodes can be feedforwarded or feedback.

[5] Avinash Golande et al, proposed "Heart Disease Prediction Using Effective Machine Learning Techniques" in which few data mining techniques are used that support the doctors to differentiate the heart disease. Usually utilized methodologies are k-nearest neighbour, Decision tree and Naïve Bayes. Other unique characterization-based strategies utilized are packing calculation, Part thickness, consecutive negligible streamlining and neural systems, straight Kernel selfarranging guide and SVM (Bolster Vector Machine).

[6] Lakshmana Rao et al,proposed "Machine Learning Techniques for Heart Disease Prediction" in which the contributing elements for heart disease are more. So, it is difficult to distinguish heart disease.To find the seriousness of the heart disease among people different neural systems and data mining techniques are used.

[7] Abhay Kishore et alproposed "Heart Attack Prediction Using Deep Learning" in which heart attack prediction system by using Deep learning techniques and to predict the probable aspects of heart related infections of the patient Recurrent Neural System is used. This model uses deep learning and data mining to give the best precise model and least blunders. This paper acts as strong reference model for another type of heart attack prediction models

[8] Senthil Kumar Mohan et al, proposed "Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques" in which their main objective is to improve 4 exactness in cardiovascular problems. The algorithms used are KNN, LR, SVM, NN to produce an improved exhibition level with a precision level of

88.7% through the prediction model for heart disease with hybrid random forest with linear model (HRFLM).

[9] Anjan N. Repaka et al, proposed a model stated the performance of prediction for two classification models, which is analysed and compared to previous work. The experimental results show that accuracy is improved in finding the percentage of risk prediction of our proposed method in comparison with other models.

[10] Aakash Chauhan et al, proposed "Heart Disease Prediction using Evolutionary Rule Learning". Data is directly retrieved from electronic records that reduce the manual tasks. The amount of services are decreased and shown major number of rules helps within the best prediction of heart disease. Frequent pattern growth association mining is performed on patient's dataset to generate strong association.

Methodology/ Planning of work

The working of the system starts with the collection of data and selecting the important attributes. Then the required data is pre-processed into the required format. The data is then divided into two parts training and testing data. The algorithms are applied and the model is trained using the training data. The accuracy of the system is obtained by testing the system using the testing data. This system is implemented using the following modules.

1.) Collection of Dataset

2.) Selection of attributes

3.) Data Pre-Processing

4.) Balancing of Data

5.) Disease Prediction

Facilities required for proposed work

SYSTEM CONFIGURATION

Hardware requirements:
Processer: Any Update Processer
Ram: Min 4GB
Hard Disk: Min 100GB

Software requirements:

Operating System: Windows family
Technology: Python3.7
IDE: Jupiter notebook

References

[1] Soni, Jyoti, et al. "Predictive data mining for medical diagnosis: An overview of heart disease prediction." International Journal of Computer Applications 17.8 (2011): 43-48.

[2] Dangare, Chaitrali S., and Sulabha S. Apte. "Improved study of heart disease prediction system using data mining classification techniques." International Journal of Computer Applications 47.10 (2012): 44-48.

[3] Uyar, Kaan, and Ahmet İlhan. "Diagnosis of heart disease using genetic algorithm based trained recurrent fuzzy neural networks." Procedia computer science 120 (2017): 588-593.

[4] Kim, Jae Kwon, and Sanggil Kang. "Neural network-based coronary heart disease risk prediction using feature correlation analysis." Journal of healthcare engineering 2017 (2017).

[5] Baccouche, Asma, et al. "Ensemble Deep Learning Models for Heart Disease Classification: A Case Study from Mexico." Information 11.4 (2020): 207.

[6] https://archive.ics.uci.edu/ml/datasets/Heart+Disease

[7] https://www.kaggle.com/ronitf/heart-disease-uci

[8] https://www.robots.ox.ac.uk/~az/lectures/ml/lect2.pdf

[9] https://nthu-datalab.github.io/ml/labs/03_Decision-Trees_RandomForest/03_Decision-Tree_Random-Forest.html

[10] https://www.kaggle.com/jprakashds/confusion-matrix-in-python-binaryclass

[11] scikit-learn, keras, pandas and matplotlib