



“Heart Disease Prediction Using Machine Learning”

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Abstract: Heart disease is one of the most critical human diseases in the world and affects human life very badly. In heart disease, the heart is unable to push the required amount of blood to other parts of the body. The diagnosis of heart disease through traditional medical history has been considered as not reliable in many aspects. Accurate and on time diagnosis of heart disease is important for heart failure prevention and treatment. So, there is a need of reliable, accurate and feasible system to diagnose such diseases in time for proper treatment. Correct diagnosis and treatment at an early stage can save people from heart disease and its consequences. Machine learning is one of the fast-growing aspects in current world. Machine learning is helpful in detection and diagnosis of various heart disease. The heart disease consists of set of range of disorders affecting the heart. It includes blood vessels problem such as irregular heart beat issues, weak heart muscles, cardio vascular disease and coronary artery disease. It reduces the blood flow through the heart leading to the heart attack. For this kind of work large and authenticated observations related to patient's health are required. This project proposes a prediction model to predict whether patient have a heart disease or not by using entered symptoms and to give an awareness on heart disease and some useful tips on heart disease. The proposed work predicts the chances of heart disease and classifies patient's risk level by implementing K-Nearest Neighbour machine learning algorithm. These machine learning algorithms predicts the chances of heart failure with high accuracy.

Keywords: Heart Disease, Machine Learning, K-Nearest Neighbour

INTRODUCTION

Human heart is the principal part of the human body. Basically, it regulates blood flow throughout our body. Any irregularity to heart can cause distress in other parts of body. Any sort of disturbance to normal functioning of the heart can be classified as a heart disease. Heart diseases have emerged as one of the most prominent causes of death all around the world. According to World Health Organization, heart related diseases are responsible for the taking 17.7 million lives every year, 31% of all global deaths. In India too, heart related diseases have become the leading cause of mortality. Heart diseases have killed 1.7 million Indians in 2016, according to the 2016 Global Burden of Disease Report, released on September 15, 2017. Heart related diseases increase the spending on health care and also reduce the productivity of an individual. Estimates made by the World Health Organization (WHO), suggest that India have lost up to billion, from 2005-2015, due to heart related or cardiovascular diseases. Thus, feasible and accurate prediction of heart related diseases is very important. Medical organizations, all around the world, collect data on various health related issues. These data can be exploited using various machine learning techniques to gain useful insights. But the data collected is very massive and, many a times, this data can be very noisy. These datasets, which are too overwhelming for human minds to comprehend, can be easily explored using various machine learning techniques. Thus, these algorithms have become very useful, in recent times, to predict the presence or absence of heart related diseases accurately.

FEATURES FOR SYSTEM REQUIREMENTS

The algorithm is working well with the sample dataset used. Implementing the algorithm with large dataset could give better results which can aid as a supporting tool in making medical decisions. In future, other possible algorithms could be implemented where efficiency of all algorithms could be analysed to decide on best suitable technique in terms of speed, reliability, and accuracy. There are many possible improvements that could be explored to improve the scalability and accuracy of this prediction system. Hardware may get added with the system and make the system more independent. Due to time limitation, this work needs to be performed for the future.

**EXISTING SYSTEM**

- In India, clinical decisions are often made based on doctors Experience rather than on the knowledge of rich data hidden in the database.
- This practice leads to unwanted errors & high cost which affect to quality of service provided to patients.
- There are many ways that medical misdiagnosis is present itself, whether a doctor is at fault, or hospital staff etc.
- The national patient safety foundation cited that 42% of medical patients feel that they have had experienced a medical error or misdiagnosis.

PROPOSED SYSTEM

- Health care industries collect huge amounts of data that contain some hidden information, which is useful for making effective decisions/Prediction.
- There are number of Machine learning algorithms are used to make decisions effectively in the prediction of heart diseases.
- There are number of attributes (like Age, Chol, Cp etc.) On which these algorithms can predict heart disease effectively and accurately.

OBJECTIVE

The objective behind the implementation of “Heart Disease Prediction Using Machine Learning” is to in today’s world, heart disease has become common disease for almost everyone and therefore the deaths has also increased. So, to prevent people from this we have come up with some solution which are as follow:

- To study about heart disease prediction using various algorithms and identify the important attributes of heart diseases.
- To study and research on algorithms for comparing accuracy.
- Build a “Heart Disease Prediction Model” by utilizing datasets.
- Predict whether the patient has high risk/low risk of cardiac failure based on the provided health parameters.

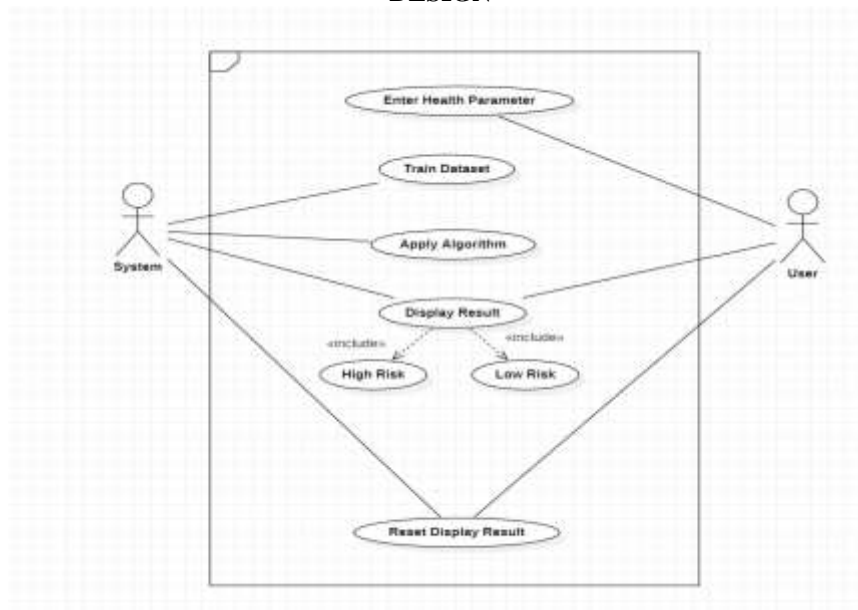
DESIGN

Fig. 1. Use case diagram

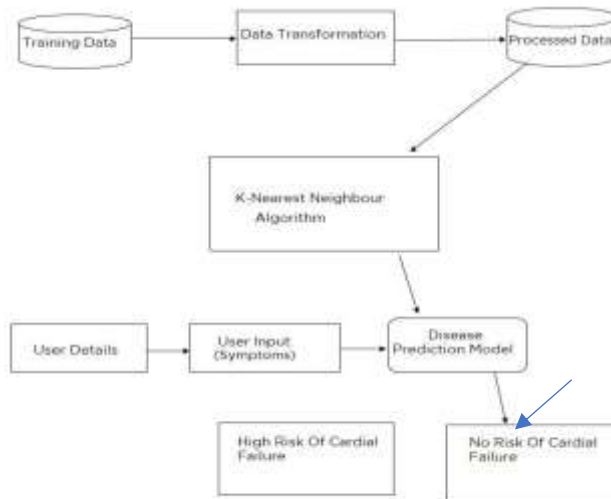


Fig. 2. System Architecture

IMPLEMENTATION

Implementation is the phase where vision and plans become reality. It is the stage of project where the theoretical design is turned out into the working system. Thus, it can be considered to be the most critical stage in achieving the most successful system and in giving the user, condense that the new system will work and be active. This is the logical conclusion after evaluating, deciding, planning applying for funds and resources of a project.

K Nearest Neighbours

This classifier looks for the classes of K nearest neighbour of a given data point and based on the majority class, it assigns a class to this data point. However, the number of neighbours can be varied. We have compared the accuracy score of our model by varying the value of neighbours i.e., K and calculated the test score.

K-Nearest Neighbour is one of the simplest Machine Learning algorithms based on Supervised Learning technique.

- K-NN algorithm stores all the available data and classifies a new data point. This means when new data appears then it can be easily classified into a well suite category 35 by using K- NN algorithm.
- K-NN is a non-parametric algorithm, which means it does not make any assumption on under lying data.
- It is also called a lazy learner algorithm because it does not learn from the training set immediately instead it stores the dataset and at the time of classification, it performs an action on the dataset.
- KNN algorithm at the training phase just stores the dataset and when it gets new data, then it classifies that data into a category that is much similar to the new data.

1)Dataset: We have used the dataset called 'Heart Disease Dataset' from Kaggle platform which contains 1025 different observations each having 14 attributes related to human heart.

2)Attributes:

- I) Age: The first attribute defining the age of person.
- II) Sex: The attribute number two describes the gender of person. [0 means female and 1 means male]
- III) CP: The Third attribute defining the level of chest pain.
- IV) RestBP: The next attribute describes about the blood pressure level.
- V) chol: This column is showing cholesterol level recorded.
- VI) FBS: The next attribute describes about the fasting blood sugar level in the patient.
- VII) RestECG: This parameter showing the result of ECG from 0 to 1.
- VIII) Thalach: The maximum value of heartbeat counted at the time of admission.
- IX) Exang: This parameter was used to understand about does exercise induce angina or not.
- X) OldPeak: The next attribute is defining the patient's depression status.
- XI) Slope: The condition of the patient during peak exercise.
- XII) CA: This attribute is showing status of fluoroscopy.

XIII) Thal: This parameter is another kind of test required for the patient having chest pain or breathing difficulty.

Advantages:

- It is simple to implement.
- KNN is robust to noisy training data.
- It is also called as Instance Based Learning.

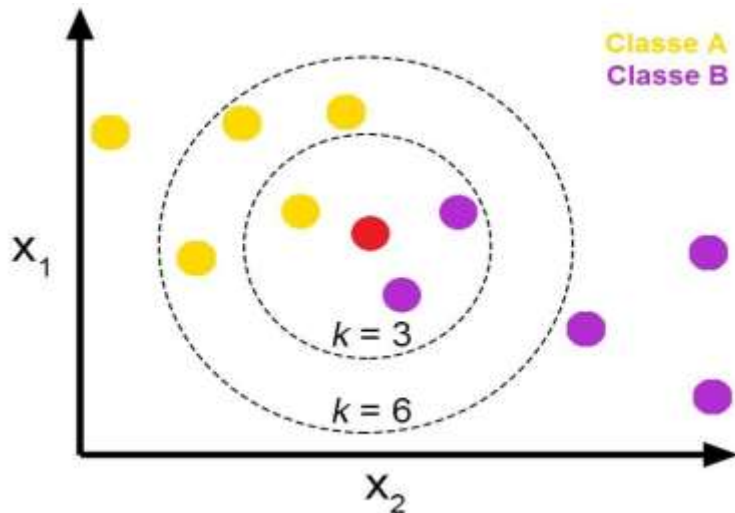


Fig. 3. KNN Algorithm

RESULT AND DISCUSSION

After entering the values and hitting the “Enter” button, the Cardiac failure prediction system starts its work. If the system predicts that the patient is having the high chances of cardiac failure then it pop ups the new window as shown in below figure. [Refer Figure 5]. This window displays the simple message “HIGH CHANCES OF CARDIAC FAILURE” along with the information of closest Coronary Care Unit (CCU). The basic information of CCU if provided like name, contact details, address etc. Moreover, a link is also provided on this window which will redirects the user to the website of that CCU.



Fig. 4: Application Screen

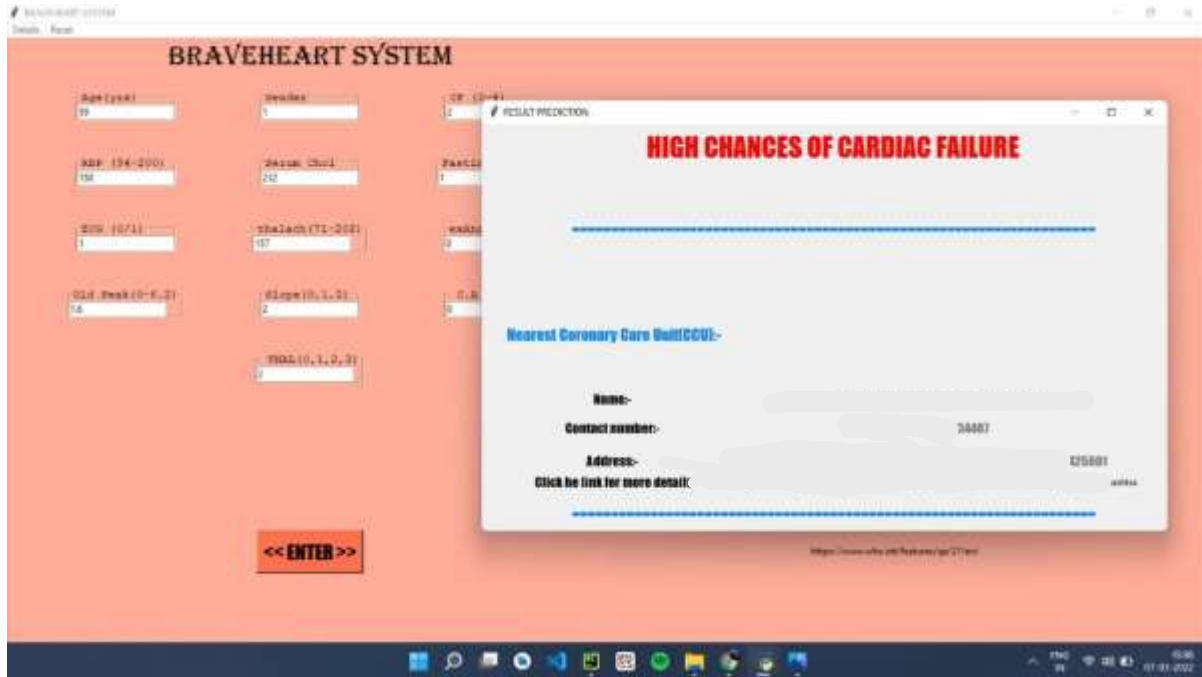


Fig.5. Output when high chances of cardiac failure is predicted

On the other hand, if the system predicts that the patient is not having any chances of cardiac failure and is completely ok then another window pops up and we can see [Refer Figure 6]. This window also displays a simple message as “NO DETECTION OF CARDIAC FAILURE”.



Fig. 6: Detail Tab Screen

CONCLUSION

The proposed system is GUI based, user-friendly, scalable, reliable and an expandable system. The proposed working model can also help in reducing treatment costs by providing initial diagnostic in time. The model can also serve the



purpose of training tool for medical students and will be a soft diagnostic tool available for physician and cardiologist. General physicians can utilize this tool for initial diagnosis of cardio-patient. There are many possible improvements that could be explored to improve the scalability and accuracy of this prediction system. The number of people facing heart diseases is on a raise each year. This prompts for its early diagnosis and treatment. The utilization of suitable technology support in this regard can prove to be highly beneficial to the medical fraternity and patients. With the increasing number of deaths due to heart diseases, it has become mandatory to develop a system to predict heart diseases effectively and accurately. The motivation for the study was to find the most efficient ML algorithm for detection of heart diseases. This study compares the accuracy score of K-Nearest Neighbour algorithms for predicting heart disease.

REFERENCES

1. Heart diseases prediction and classification using machine learning algorithm optimized by particle swarm optimization and ant colony optimization. Author=Youness khourdifi Mohammad Bajaj ...oct 22., 2018
2. Dinesh kumar G,santhosh kumar D,arumugaraj K,marrisvari V "prediction of heart disease using machine leaning algorithm" 2018
3. Marimuthu muthuvel"review of heart disease prediction hain machine learning approach" sep 2018
4. Sanjay Kumar Sen" predicting and diagnosing of heart disease using machine learning algorithm" June2017
5. Automated diagnosis of heart disease using random Forest algorithm Author = Prof. Priya Patil, Prof. S. A.Kinariwala...2018
6. Hemalatha k n,keerthana m,meghana h r,afreen taj,bhuvana m"Heart disease prediction system" May2019
7. Fahad alotaibi"implementation of machine learning to predict heart failure" june 2019
8. Senthilkumar mohan,chadragegar thirumala,gautam shrivastava "Effective heart disease prediction using hybrid machine learning " may 2019
9. Anagha sridhar,Anagha s kapardhi "Prediction of Heart disease using machine learning" Apr 2019
10. Rajesh N, T Maneesha, Shaik Hafeez,Hari Krishna"Prediction of heart disease using machine learning"July 2018
11. Prediction of Heart disease using machine learning algorithm .Author=Mr. Santhana Krishana J.