



An Efficient Machine Learning Prediction Model in Identifying the risk of heart disease

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ABSTRACT

Machine Learning is used across many ranges around the world. The healthcare industry is no exclusion. Machine Learning can play an essential role in predicting presence/absence of locomotors disorders, heart diseases and more. Such information, if predicted well in advance, can provide important intuitions to doctors who can then adapt their diagnosis and dealing per patient basis. We work on predicting possible Heart Diseases in people using Machine Learning algorithms. Heart disease is a leading cause of mortality in the modern world, responsible for around one death per minute. This ratio takes into account persons in the age range of 25 to 69 and accounts for both males and females; however, it may vary by area. This in no way rules out the possibility of heart disease affecting persons of various ages. Predicting the etiology and progression of this illness is a big difficulty in the modern world, and it may manifest itself at any age. In this paper, we've looked at a number of different methods for predicting cardiac issues.

KEY WORDS: Decision tree, Data mining, Heart Disease Prediction, Naïve Bayes, K-means, Machine learning.

1. INTRODUCTION

This paper primarily focuses on data mining approaches that are helpful in predicting heart disease using a variety of available data mining technologies. A malfunctioning heart may cause problems for the human body as a whole, including the brain, kidneys, and other organs. When the heart is afflicted by illness, it is called heart disease. Heart disease has surpassed all other causes of mortality in modern times. The World Health Organization (WHO) estimates that cardiovascular disease kills 12 million people annually. Diseases of the heart include cardiovascular disease, coronary disease, heart attack, and knock. Knock is a kind of cardiac disease that develops when blood arteries that supply

the brain are either expanded, constricted, or weakened; high blood pressure may also play a role in its onset. In today's healthcare system, achieving technological and infrastructure dominance is the primary obstacle. The quality of care delivered to patients relies on their doctors' ability to accurately diagnose their conditions and treat them successfully.

The devastating consequences of a wrong diagnosis are often disregarded. Medical history records and data are extensive, yet they come from a wide variety of sources. Doctors' interpretations are a crucial part of this information. Due to the potential for noise, incompleteness, and inconsistency in real-world data, data preprocessing will be necessary in directive to fill in

the missing values. Despite the fact that cardiovascular disease has been identified as a leading cause of mortality worldwide, it has also been declared to be one of the most preventable and treatable conditions. Proper and timely diagnosis of an illness is crucial to its complete and correct care. There seems to be a critical need for a reliable and systematic technique of identifying individuals at high risk and data mining for rapid investigation of heart infection. It's important to remember that the signs and symptoms of heart disease might vary from person to person. Pain in the back, jaw, neck, stomach, shortness of breath, chest, arms, and shoulders are common complaints. Heart disorders come in many forms, with heart failure, stroke, and coronary artery disease being just a few examples [3]. It's true that heart disease is the most common kind of chronic illness worldwide, but it's also the most preventable. Main prevention of heart disease may be achieved via adopting a healthy lifestyle, and secondary prevention can be achieved through prompt diagnosis. The importance of regular checkups (inferior preventive) in diagnosing and preventing heart disease issues early on cannot be overstated. Several diagnostic procedures, including angiograms, chest X-rays, echocardiograms, and an activity tolerance test, corroborate the seriousness of the problem. However, these examinations may be quite costly and need precise medical equipment. Doctors specializing in the heart maintain a large and thorough database of patient information. It also provides a fantastic opportunity for extracting useful information from large databases.

The variables that put people at risk for heart disease are the subject of intensive study, with researchers using a wide range of statistical methods and data mining software. Smoking, advanced age, hypertension, diabetes, high cholesterol levels, high blood pressure, a family history of heart disease, being overweight, and not getting enough exercise are all recognized as risk factors for cardiovascular disease, according to statistical analyses. Awareness of cardiac illnesses is crucial for the prevention and treatment of those at risk of developing the condition. In order to aid experts and doctors in the diagnosis of heart disease, researchers have turned to a variety of data mining approaches. Decision trees, k-nearest neighbors, and Naive Bayes are frequent methods of choice. Other methods for classifying data include the bagging algorithm, kernel density, sequential

minimum optimization, neural networks, a straight Kernel self-organizing map, and support vector machines (Support Vector Machine). The methods that were implemented in this research are described in depth in the next section. Coronary heart disease (CHD), cerebrovascular disease (Stroke), congenital heart disease (CHD), provocative heart diseases (PHD), hypertensive heart diseases (HHD), and peripheral artery disease (PAD) are all examples of cardiovascular disease. Tobacco use, poor nutrition, lack of exercise, and excessive alcohol use are the main contributors to cardiovascular disease. It's no secret that the research of cardiac illnesses makes use of several categories of current mathematical data mining technologies.

2. LITERATURE SURVEY

Mohammed Abdul Khaleel has [2] presented a paper in the Survey of Data Mining Techniques on Medical Data for Detecting Common Diseases in the Area. This study focuses on medical information mining techniques necessary for identifying locally visit diseases like heart ailments, lung cancer, breast disease, and so forth. To study and diagnose cardiac illness, Vembandasamy et al. conducted information mining to extract information for discovering inactive instances. This application made use of the Naive Bayes method. In the Naive Bayes algorithm, Bayes's theorem was employed. This means that Naive Bayes has a lot of leeway to form inferences on its own. The dataset utilized comes from a top research center for diabetes in Chennai, Tamil Nadu. The collection includes information from more than 500 individuals. Weka is utilized for categorization, and 70% Percentage Split is employed to carry it out. Naive Bayes guarantees an 86.419% success rate. Predicting Remote Health Monitoring Outcomes with Data from the First Month and Baseline Interventions, a work written by Costas Sideris, Nabil Alshurafa, Haik Kalantarian, and Mohammad Pourhomayoun ([3]).

Saving money and lowering disease rates are two of the main benefits of RHM systems. In this research, the authors provide an improved RHM framework called Wanda- CVD, which is mobile phone based and designed to provide distant teaching and social support to participants. Social security organizations all throughout the globe see CVD preventative intervention measures as a fundamental priority. A presentation titled "Prediction for Similarities of Disease Using ID3

Algorithm in Television and Mobile Phone" was presented by L.Sathish Kumar and A. Padmapriya [4]. This research presents a disguised and automated method of handling cardiac disease cover-up recognize designs. Information extraction techniques, such as the ID3 algorithm, are included into the provided framework. The suggested strategy not only increases public awareness of illnesses but also has the potential to cut down on the number of fatalities and afflicted individuals. [5].

In their study "Disease Predicting System Using Data Mining Techniques," M.A.Nishara Banu and B.Gomathy present their methodology for doing just that. They discuss the MAFIA (Maximum Frequent Item set algorithm) and K-Means clustering methods in this work. Because illness forecasting relies heavily on proper categorization. When used together, MAFIA and K-Means provide an accurate categorization. In their article titled "Intelligence System for Diagnosis Level of Coronary Heart Disease using K-Star Algorithm," [6] Wiharto and Hari Kusnanto present their system. In this study, they provide a prediction framework for heart infection based on a computation made using a Neural Network trained with Learning Vector Quantization. This framework's neural system is able to recognize 13 clinical features as information, making predictions about the presence or absence of coronary sickness in the patient and other performance metrics.

[7]. Using the Learning Vector Quantization Algorithm, D.R. PatiI and Jayshril S. Sonawane have presented a paper titled Prediction of Heart Disease. In this study, they provide a prediction framework for heart infections based on the calculation techniques of the Learning vector Quantization neural system. The neural system in this framework is able to recognize 13 clinical features as information and make predictions about the presence or absence of cardiac sickness in the patient, in addition to other performance indicators.

3. METHODOLOGY

3.1 Data Preprocessing:

Data that we wish to analyze is not likely to be clean, in the sense that it may include noise or have values that are missing, therefore in order to achieve decent results, we need to eradicate all of these problems, a process known as data cleaning. Using methods like inserting

the most frequent value possible in the blank to eliminate noise, we will complete the data.

Data normalization, smoothing, generalization, and aggregation are all examples of transformations that may be applied to raw data to make it more digestible.

Integration: Data that we don't need to process may not come from a single source; instead, it may come from multiple sources, each of which could cause complications later on in the processing pipeline. As a result, integration is a crucial step in the data pre-processing pipeline, and a variety of factors are taken into account in this section.

As we deal with data, it is possible that it may be complicated and difficult to grasp; in these cases, we will do reduction to simplify the data and make it more amenable to the system, allowing us to get better outcomes.

3.2 Proposed System:

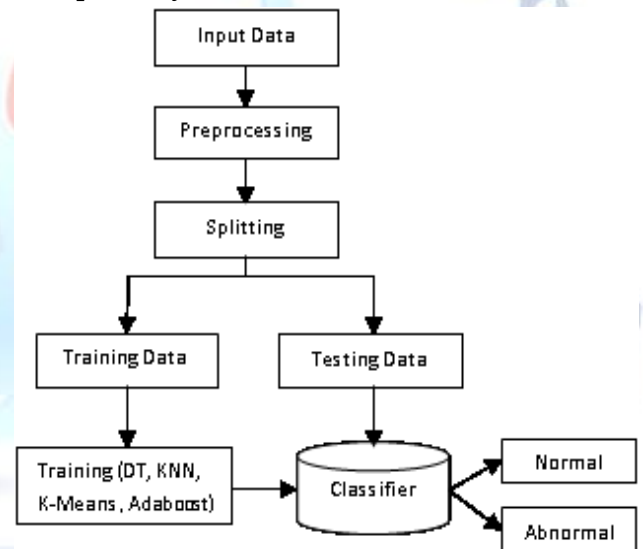


Fig. 1: System we suggest for the problem

Based on the results of the experiment described above, we can conclude that the accuracy of the predictions made using the Random Forest algorithm and the other algorithms may vary. As a result, it is not necessary to make a comparison of the two algorithms before making any predictions in order to obtain accurate results. In the same vein, if we use only a single algorithm that is unable to pre-process data, we will not be able to obtain accurate results.

4. CONCLUSIONS:

Heart diseases are a major killer in India and throughout the world, application of promising technology like machine learning to the initial prediction of heart

diseases will have a profound impact on society. The early prognosis of heart disease can aid in making decisions on lifestyle changes in high-risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. 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.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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