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A Review of Techniques for Heart Disease Diagnosis and Prediction

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ABSTRACT: The expression popularly used to suggest that we are currently living in an “information age” is correct. We produce terabytes of data every day. Data mining is the process of turning a data set into information. In the health care industry, data is generated daily at a high volume. However, only a small amount of it is really put to use. There are not many efficient techniques available to retrieve knowledge from these databases for clinical disease detection or other uses. The goal of this document is to present some of the current research into the use of data mining techniques to forecast cardiac disorders. Determine which techniques are useful and efficient when using different mining methods. Future predictions have also been mentioned.

KEYWORDS: Heart Diseases; Machine Learning; Data Mining; Clustering; Classification.

I. INTRODUCTION

One of the most important organs in the human body is the heart. It circulates blood through the circulatory system's blood vessels. The circulatory system is critical because it distributes blood, oxygen, and other materials to all of the body's organs. The heart is the most important component of the circulatory system. If the heart isn't working properly, it can cause major health problems, including death.

Types of Cardiovascular Diseases

Heart and blood vessel disorders, sometimes known as cardiovascular diseases (CVD), are a group of illnesses that affect the heart and blood vessels. Coronary artery disease (CAD), such as angina and myocardial infarction, is a type of cardiovascular illness (commonly known as a heart attack). Another type of heart disease is coronary heart disease (CHD), which occurs when a waxy material known as plaque forms inside the coronary arteries. These are the arteries that provide the cardiac muscle with oxygen-rich blood. Atherosclerosis is a condition that occurs when plaque builds up in the arteries. Plaque develops over a long period of time. This plaque can harden or rupture with the passage of time (break open). The coronary arteries become narrowed as plaque hardens, reducing the flow of oxygen-rich blood to the heart. A blood clot might form on the surface of this plaque if it ruptures. A big blood clot can totally stop blood flow via a coronary artery in most cases. The punctured plaque hardens and narrows the coronary arteries over time. The segment of heart muscle begins to perish if the interrupted blood flow is not restored immediately. A heart attack can cause major health problems and possibly death if not treated quickly. Heart attacks are a leading cause of death all over the world.

The following are some of the most prevalent heart attack symptoms

Chest pain: The most common sign of a heart attack is chest pain. If a person has a clogged artery or is having a heart attack, he may experience chest pain, tightness, or pressure.

Nausea, Indigestion, Heartburn and Stomach Pain: These are some of the signs and symptoms of a heart attack that are frequently neglected. Women are more likely than men to exhibit these symptoms.

Pain in the Arms: The discomfort usually begins in the chest and gradually spreads to the arms, particularly on the left side.

Feeling Dizzy and Light Headed: Things that cause a loss of equilibrium.

Fatigue: Simple chores that begin to make you exhausted should not be overlooked.

Sweating: Stroke, heart failure, hypertensive heart disease, rheumatic heart disease, Cardiomyopathy, Cardiac arrhythmia, congenital heart disease, Valvular heart disease, Aortic aneurysms, Peripheral artery disease, and venous

thrombosis are some more frequent cardiovascular illnesses. Heart disease can occur as a result of anomalies in the circulatory system's functioning, or it can be exacerbated by specific lifestyle choices such as smoking, particular dietary habits, sedentary living, and so on. Heart disorders can be treated appropriately and kept under control if they are diagnosed early. The importance of early detection in this case cannot be overstated. Knowing the whys and wherefores of heart disease will aid in prevention in the long run.

Prevalence of Cardiovascular Diseases:

Cardiovascular disorders are responsible for an estimated 17.5 million deaths worldwide. Cardiovascular illnesses account for more than 75% of deaths in middle- and low-income countries. Furthermore, stroke and heart attack account for 80% of all deaths caused by CVDs [3]. Every year, India adds a growing number of CVD patients. In India, there are currently more than 30 million people suffering from heart disease. Every year, around two lakh open heart procedures are conducted in India. The number of patients requiring coronary interventions has been rising at a rate of 20% to 30% for the past few years [4], which is cause for concern.

II. LITERATURE SURVEY

Cardiovascular disease has been the leading cause of death worldwide for the past decade. In the United States alone, nearly one person dies from a cardiac condition every minute. To reduce the number of deaths due to heart disease, a quick and cost-effective diagnosis system based on data processing is required. Based on the results of the experiments, it was determined that the J48 tree technique is the best classifier for heart disease prediction because it has a high level of accuracy and takes the least amount of time to develop [1].

Data mining is defined as the mechanical discovery of relationships in large databases, and in certain situations, it is also used to anticipate associations based on the results discovered. Data mining is compared to a smaller number of attributes. Naive Bayes, Decision Tree, and Classification by Clustering Method are their names. Using the genetic search strategy, the fourteen traits are reduced to six. Furthermore, the severity of the illness influenced the outcomes [2].

A Random Forest classifier appears to be the best successful model for predicting patients with cardiomyopathy. The most difficult aspect of the data mining method or machine learning process is dealing with data discrepancies, missing numbers, screaming five knowledge, and outliers. To regulate the information quality, applied math and machine learning approaches should be used [3].

To achieve a healthy cardiovascular system To anticipate risk variables for cardiovascular disease, Navies theorem is used to build a prediction. The focus of this study is on identifying heart conditions. The information is gathered utilizing numerous sources that are primary factors in any form of cardiovascular illness, and the information is organized using a structure. The rapid growth of technology has resulted in a significant increase in mobile health technology, which is one of the many internet applications [4].

Because it is impractical for a normal man to undergo expensive tests such as the electrocardiogram on a regular basis, there must be a system in place that is both convenient and reliable in forecasting the likelihood of cardiovascular disease. As a result, we propose developing a companion application that can forecast the vulnerability of a cardiovascular disease based on fundamental symptoms such as age, sex, pulse, and so on. If the number of people who utilise the system grows, the system will be able to identify their present heart health status, and hence the number of people dying from heart disease will decrease [6].

Prediction is based on simple, cost-effective medical tests that may be performed at any local clinic. Furthermore, because the model is trained using real-life data of various ages of healthy and sick patients, it is used to determine and provide further confidence and accuracy to the Doctor's identification. The model is used to help clinicians analyse patients in order to authenticate their identification and reduce human error [7].

A classifier model that can predict sickness with greater performance and accuracy is created using Random Forest and Support Vector Machine. It is possible to cure them with appropriate treatments using contemporary medical technologies. However, if it is detected late, even the most advanced medical technology will be ineffective [10]. The



accuracy of the structure is also improved by using various combinations of data mining techniques as well as parameter standardization.

This inquiry informs the United States about various technologies that are used in various papers with a variety of qualities and completely diverse accuracies depending on the instruments used for execution [15]. The majority of the researchers had no intention of building a web application or interacting with the framework. The majority of created systems relies solely on algorithms for accuracy and has never been applied in real life with any model, which is irrelevant for meaningful data. The majority of studies only use a few parameters in their data. As a result, an appropriate model should be given, with front end HTML interacting with the Flask framework using a machine learning method.

III. CONCLUSIONS

When heart illnesses worsen, they spiral out of control. Heart illnesses are complex, and they claim the lives of many people each year. If the early signs and symptoms of heart disease are ignored, the patient may face serious repercussions in a short period of time. In today's environment, sedentary lifestyles and excessive stress have exacerbated the problem. It is possible to keep the disease under control if it is discovered early. However, it is always essential to exercise on a daily basis and to break bad habits as soon as possible. Tobacco use and poor eating habits raise the risk of stroke and heart disease. It's a good idea to eat at least 5 servings of fruits and vegetables each day. It is recommended that heart disease patients limit their salt intake to one teaspoon per day. One of the key flaws in these studies is that the emphasis has been on the application of classification algorithms for heart disease prediction rather than on the numerous data cleaning and pruning strategies that prepare and prepare a dataset for mining. It has been discovered that a dataset that has been adequately cleaned and pruned delivers substantially greater accuracy than one that has missing values. The development of prediction systems with improved accuracy will be aided by the use of appropriate data cleaning procedures and effective categorization algorithms.

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