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HEART DISEASE PREDICTION SYSTEM USING DATA

MINING TECHNIQUES

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ABSTRACT

Data mining is process to analyses number of data sets and then extracts the meaning of data. It helps to predict the patterns and future trends, allowing business in decision making. Data mining applications are able to give the answer of business questions which can take much time to resolve traditionally. High amount of data that can be generated for the prediction of disease is analyzed traditionally and is too complicated along with voluminous to be processed. Data mining provides methods and techniques for transformation of the data into useful information for decision making. These techniques can make process fast and take less time to predict the heart disease with more accuracy. The healthcare sector assembles enormous quantity of healthcare data which cannot be mined to uncover hidden information for effectual decision making. However, there is a plenty of hidden information in this data which is untapped and not being used appropriately for predictions. It becomes more influential in case of heart disease that is considered as the predominant reason behind death all over the world. In medical field, Data Mining provides several methods which are widely used in

the medical and clinical decision support systems which should be helpful for diagnosis and predicting of various diseases. These data mining techniques can be used in heart diseases takes less time and make the process much faster for the prediction system to predict diseases with good accuracy to improve their health.

Keywords: Heart disease, Prediction, Classification, Decision Table, Bayesian Classifiers.

I. INTRODUCTION

Data mining used to gather, store, analyze and integrate biological information which can then be usedfor discovery and development. Medical Data mining in healthcare is regarded as an important yet complicatedtask that needs to be executed accurately and efficiently. Healthcare data mining attempts to solve real worldhealth problems in diagnosis and treatment of diseases. This survey paper aims to analyze the several datamining techniques proposed in recent years for the diagnosis of heart disease. Many researchers used datamining techniques in the diagnosis of diseases such as tuberculosis, diabetes, cancer and heart disease, in which several data mining techniques are used in the diagnosis of

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heart disease such as KNN, Neural Networks, and Bayesian classification.

II. HEART DISEASE

The heart is an important organ of our body. If the operation of a heart is not proper, it will affect the other body parts of a human such as a brain, kidney etc. It is nothing more than a pump, which pumps blood through the body. If the circulation of blood in the body is inefficient the organs like brain suffers and if the heart stops working altogether, end occurs within minutes. Life is completely dependent on the efficient working of the heart. The term Heart disease refers to disease of heart & the blood vessel system within it. Thus the flow of the blood to the heart can either slow down or stop as shown in the Fig 1.



Fig 1: Cause of Heart attack

Reason for heart diseases

Heart diseases can be caused due to number of factors:

High blood pressure: When the heart pumps blood, the force of the blood pushes against the walls of the arteries causing pressure. If the pressure rises and stays high over the time it is called high blood pressure or hypertension which can harm the body in many ways i.e. increasing the risk of heart stroke or developing heart failure, kidney failure etc.

High cholesterol: Cholesterol is a waxy substance found in the fatty deposits in the blood vessels. Increase in the fatty deposits (high cholesterol) does not allow sufficient blood to flow in through the arteries causing heart attacks.

Unhealthy diet: Eating too much fast food increases blood pressure and cholesterol level causing the risk of heart attacks.

Smoking: It damages the lining of arteries and builds up a fatty material called atheroma which narrows the arteries causing heart attacks.

Lack of physical activity: Lack of exercise increases cholesterol level in blood vessels which further increases the risk of heart attacks.

Obesity: Obese people are more likely to have high blood pressure, high cholesterol level and diabetes (increase in blood sugar level) which increases the risk of heart strokes in human body. Nowadays, data mining is gaining popularity in health care industry as this industry generates large amount of complex data about hospital resources, medicines, medical devices, patients, disease diagnosis etc. This complex data needs to be processed and analysed for knowledge extraction which will further help in decision making and is also cost effective. Heart disease is a broad term that includes all types

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of diseases affecting different components of the heart. Heart means 'cardio.' Therefore, all heart diseases belong to the category of cardiovascular diseases.

TYPES OF HEART DISEASES

1. Coronary heart disease

It also known as coronary artery disease (CAD), it is the most common type of heart disease across the world. It is a condition in which plaque deposits block the coronary blood vessels leading to a reduced supply of blood and oxygen to the heart.

2. Angina pectoris

It is a medical term for chest pain that occurs due to insufficient supply of blood to the heart. Also known as angina, it is a warning signal for heart attack. The chest pain is at intervals ranging for few seconds or minutes.

3. Congestive heart failure

It is a condition where the heart cannot pump enough blood to the rest of the body. It is commonly known as heart failure.

4. Cardiomyopathy

It is the weakening of the heart muscle or a change in the structure of the muscle due to inadequate heart pumping. Some of the common causes of cardiomyopathy are hypertension, alcohol consumption, viral infections, and genetic defects.

5. Congenital heart disease

It also known as congenital heart defect, it refers to the formation of an abnormal heart due to a defect in the structure of the heart or its functioning. It is also a type of congenital disease that children are born with.

6. Arrhythmias

It is associated with a disorder in the rhythmic movement of the heartbeat. The heartbeat can be slow, fast, or irregular. These abnormal heartbeats are caused by a short circuit in the heart's electrical system.

7. Myocarditis

It is an inflammation of the heart muscle usually caused by viral, fungal, and bacterial infections affecting the heart. It is an uncommon disease with few symptoms like joins pain, leg swelling or fever that cannot be directly related to the heart.

III. DATA MINING APPLICATIONS

Data mining is used in various fields such as retail industry, telecommunication industry, healthcare industry, financial data analysis, intrusion detection, sports and also in analyzing student's performance. Retail Industry: data mining is a great application in retail industry as it collects large amount of data which includes transportation, sales and consumption of goods and services. This data expand rapidly due to increase in purchase and sales in business. Data mining helps to identify customer's buying patterns and trends that lead to improved quality of customer service and customer's satisfaction.

Telecommunication Industry: Telecommunication industry is the most growing industry as it provides various services such as fax, pager, cellular phones and e-mails.

Healthcare Industry: Data mining is very useful in healthcare industry in diagnosis of heart diseases, breast cancer and diabetes. It helps in identifying patterns and trends

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in patient's records having same risk factor and helps in decision making.

IV. CONCLUSION

Classification techniques are accomplished of processing a large amount of data. It is one of the most widely used methods of Data Mining in Healthcare organization. The widespread classification techniques used in risk prediction of heart disease are Bayesian Networks, Artificial Neural Network, Nearest Neighbour method, Fuzzy logic, Fuzzy based Neural Networks, Decision trees, Genetic Algorithms and Support Vector Machines. Also, applying hybrid data mining techniques has revealed promising results in the diagnosis of heart disease.

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