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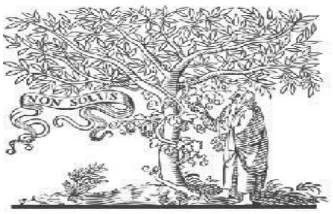

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HEART DISEASE PREDICTION USING NEURAL NETWORKS

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ABSTRACT

The heart is very important part of human body which pumps blood into the entire body. If circulation of blood in body is inefficient the organs like brain suffer and if heart stops working death occurs within minutes. The term Heart disease refers to disease of heart & blood vessel system within it. To predict the presence or absence of heart disease in human body using machine learning techniques on data set provided by using sequential model. The Main idea of this project is to predict whether the patient suffers from heart disease or not. And also predicting the risk of heart disease that is patient it is at high risk or low risk. The user enters the appropriate input values from his/her health report. After this, the historical dataset is uploaded and then transform the uploaded data into structured data with the help of a data cleaning and data imputation process. Then the neural network model is implemented on the input values and on the bases of this heart disease is predicted. By using the neural network model, we increase the prediction heart disease with more accuracy than existing system and in this we adding some new attributes in data set like whether the patient smokes or not and if the patient have obesity or not which helps in increasing the accuracy of the project.

INTRODUCTION

We know that Heart is the important part of our body. Life is itself dependent on efficient working of heart. It is a world known fact that heart is the most essential organ in human body if that organ gets affected then it also affects the other vital parts of the body. There are many factors which increases risk of Heart disease. Some of them are:

• Family history of heart diseases.

• Smoking. • Cholesterol.

• High blood pressure.

• Obesity.

• Lack of physical exercise.

As World Health Organization has estimated that 12 million deaths occur worldwide, every year due to the Heart diseases. In 2008, 17.3 million people died due to Heart Disease. Over 80% of deaths in world are because of Heart disease. WHO estimated by 2030, almost 23.6 million people will die due to Heart disease Predication should to be done to reduce risk of Heart disease. Diagnosis is usually based on signs, symptoms and physical examination of a patient. As all the doctors are predicting heart disease by learning and their experience. The diagnosis of disease is a difficult task in medical field. Predicting Heart disease from various symptoms is a big issue which may lead to unpredictable effects. Healthcare industry generates large amounts of complex data about patients, disease diagnosis, electronic patient records etc. This large amount of data to be processed and analyzed for knowledge extraction that enables for cost-savings and decision making. Only human intelligence alone is not enough for proper diagnosis. As we are facing many difficulties, to improve the accuracy of diagnosis and to

reduce the diagnosis time, we have developed an efficient and reliable Decision Support System for Heart Disease using data mining and machine learning techniques.

1.1 MACHINE LEARNING

Machine learning is a field of computer science that gives computer systems the ability to "learn" with data, without being programmed. It is an application of Artificial Intelligence that provides systems the ability to learn and improve from experience without being programmed. The primary aim is to allow the computers learn without human intervention or help and adjust action. Machine learning algorithms are often categorized as supervised, unsupervised and Reinforcement.

1. PROBLEM STATEMENT

The heart is very important part of human body. Which pumps blood into the entire body. If circulation of blood in body is inefficient the organs like brain suffer and if heart stops working death occurs within minutes. Life is completely dependent on working of the heart. The term Heart disease refers to disease of heart & blood vessel system within it. To predict the presence or absence of heart disease in human body using machine learning techniques on data set provided by using sequential model and observing the attributes which have more impact in predicting the heart disease. The Main idea of this project is to predict whether the patient suffers from heart disease or not. And also predicting the risk of heart disease that is patient it is at high risk or low risk. The user enters the appropriate input values from his/her health report

3. LITERATURE SURVEY

1. Dilip Roy Chowdhury et.al [1] represented the use of artificial neural networks in predicting neonatal disease diagnosis. We observed that the proposed technique involves training a Multilayer Perceptron with a Back-propagation learning algorithm to recognize a pattern for the diagnosing and prediction of neonatal diseases. The Back- propagation algorithm was used to train the ANN architecture and the same has been tested for the various categories of neonatal disease. Various cases of different sign and symptoms parameter have been tested in this model. This shows that ANN based prediction of neonatal disease and also improves the diagnosis accuracy with stability.

2. Vanisree K et.al [2] has been proposed a Decision Support System for diagnosis of Congenital Heart Disease. We saw that the proposed system is designed and developed by using MATLAB's GUI feature with the implementation of Back propagation Neural Network. The Back propagation Neural Network used in this study is a multilayered Feed Forward Neural Network, which is trained by a supervised Delta Learning Rule. The dataset used in this study are the signs, symptoms and the results of physical evaluation of a patient.

3. Milan Kumari et.al [3] proposed research contains data mining classification techniques like RIPPER classifier, Decision Tree, and Support Vector Machine (SVM) which are analyzed on cardiovascular disease dataset. Performance of these techniques is compared through sensitivity, specificity, accuracy, error rate, True Positive Rate and False Positive Rate. 10-fold cross validation method was used to measure the unbiased estimate of these prediction models. The analysis shows that out of these classification models SVM predicts cardiovascular disease or heart disease with

least error rate and highest accuracy. SVM is a discriminative classifier formally defined by a separating a hyperplane. In other words, given labeled training data, the algorithm outputs an optimal hyperplane which categorizes new examples

4. A proficient methodology for the extraction of significant patterns from the heart disease warehouses for heart attack prediction has been presented by Shantakumar B.Patil et.al [4]. Initially, the data warehouse is pre-processed in order to make it suitable for the mining process. Once the preprocessing gets over, the heart disease warehouse is clustered with the help of the K-means clustering algorithm. Consequently, the frequent patterns applicable to heart disease are mined with the help of the maximal frequent itemset algorithm (MAFIA) from the data extracted. In addition, the patterns vital to heart attack prediction are selected on basis of the computed significant weightage. The neural network is trained with the selected significant patterns for the effective prediction of heart attack.

5. Niti Guru et.al [5] proposed a system that uses neural network for prediction of heart disease, blood pressure and sugar. A set of 78 records with 13 attributes are used for training and testing. He suggested supervised network for diagnosis of heart disease and trained it using back propagation algorithm, the doctor using the system will find that unknown data from training data and generate list of possible disease from which patient can suffer.

4. SOFTWARE REQUIREMENTS AND SPECIFICATIONS

Systems analysis is the detailed study of a system into its component pieces to study how those component pieces internet and work. Software Requirement Specification is the starting point of the software developing activity. As system grew more complex it became evident that the goal of the entire system cannot be easily comprehended. Hence the needs for the requirement phase arouse. The software project is initiated by the client needs The SRS is the means of translating the ideas of the minds of clients (the input into a formal document). The purpose of the software requirement specification is to reduce the communication gap between the clients and the developers. Software Requirement Specification is the medium through which the client and our needs are accurately specified. It forms the basis of software development. A good SRS should satisfy all the parties involved in the system.

4.1Purpose

The purpose of this project is to develop a method for the predicting occurrence of heart disease to a patient. Machine learning is used here to improve the accuracy.

4.2Scope

This project predicts the occurrence of heart disease. It specifies the risk level of the heart disease that is whether the patient is at high risk or at low risk.

4.3Objectives

The main objective of this project is a) To predict whether a person gets heart disease or not. b) To improve the accuracy of the system to be developed.

4.4Existing System

The existing system consists of balanced random forest as a classification technique for predicting the presence of the heart disease. The proposed Gini index feature selection addresses the issues of uneven distribution of prior class probability and global goodness of

a feature in two stages. First, it transforms the samples space into a feature specific normalized samples space without compromising the intra class feature distribution. In the second stage of the framework, it identifies the features that discriminates the classes most by applying Gini coefficient of inequality. Also, Balanced Random Forest Algorithm is used for classification which handles missing values using median for numerical values or mode for categorical values. In this the accuracy rate is low. Decision tree is used as this problem is supervised learning where the data is continuously split according to a certain parameter. One advantage of tree-based methods is that they have no assumptions about the structure of the data and are able to pick up non-linear effects if given sufficient tree depth. Over fitting is a problem while binding a decision tree model. Decision tree can create complex trees that do not generalise well, and decision trees can be unstable because small variations in the data might result in a completely different tree being generated.

4.5Proposed System

The Main idea of this project is to predict whether the patient suffers from heart disease or not. And also predicting the risk of heart disease that is patient it is at high risk or low risk. The user enters the appropriate input values from his/her health report. After this, the historical dataset is uploaded and then transform the uploaded data into structured data with the help of a data cleaning and data imputation process. Then the neural network model is implemented on the input values and on the bases of this heart disease is predicted. By using the neural network model, we increase the prediction heart disease with more accuracy than existing system and in this we adding some new attributes in data set like whether the patient smokes or not and if the patient have obesity or not which helps in increasing the accuracy of the project.

4.6 REQUIREMENTS

4.6.1 FUNCTIONAL REQUIREMENTS

Functional requirement defines a function of a software system or its component and how the system must behave when presented with specific inputs or conditions. These may include calculations, data manipulation and processing and other specific functionality that define what system must accomplish. First, we pre-process the data by filling the missing values, removing outliers, scaling converting categorical to numerical Next, Building the Model for the stored pre-processed data. Next, validating and testing will be applied for the model. Finally, Predicting occurrence of heart disease to a patient.

4.6.2 NON FUNCTIONAL REQUIREMENTS

In requirements engineering, a non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviours. They are contrasted with functional requirements that define specific behaviour or functions. The plan for implementing functional requirements is detailed in the system design. The plan for implementing non-functional requirements is detailed in the system architecture, because they are usually architecturally significant requirements.

5. SYSTEM DESIGN

5.1 SYSTEM ARCHITECTURE

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System architecture is a conceptual model that defines the structure, behaviour and more views of a system. The prediction of heart disease system architecture is organized in the following way that outputs are generated in the efficient output about the presence of heart disease.

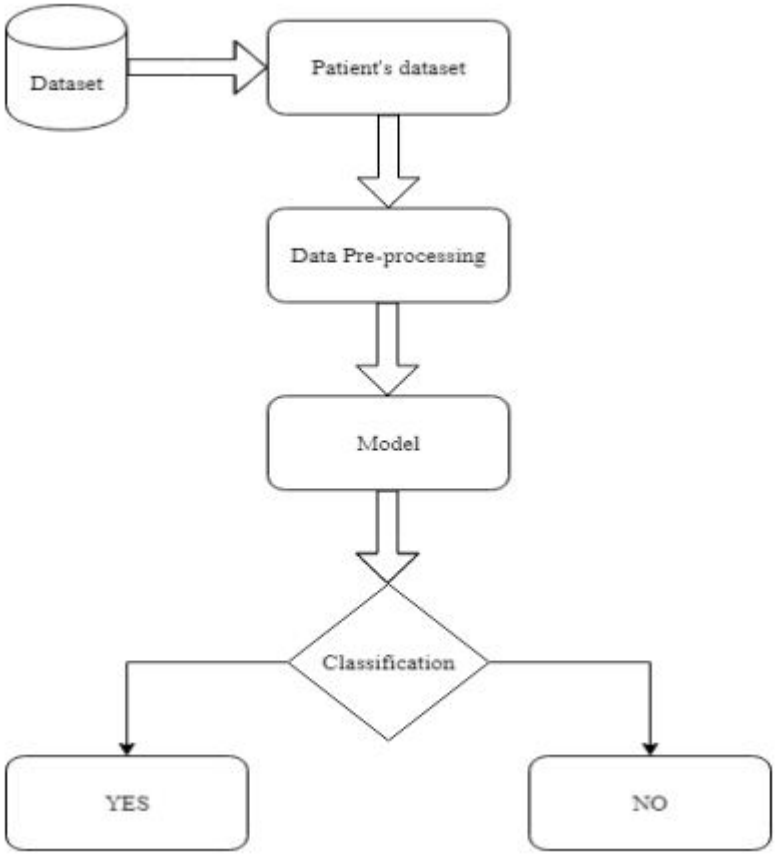

Fig. 5.1 System architecture

CONCLUSIO N

To predict the patient risk level of having heart disease, computer-based information along with data mining classification techniques like Naïve Bayes, KNN, Decision tree, Random forest ,SVM, Neural Networks are used. In this report, a Heart Disease Prediction system (HDPS) is being developed using data mining and machine learning techniques. We used neural networks to find if the patient has the heart disease. The binary result which is obtained by using Sequential model using the neural networks techniques present along with it.

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