



Survey paper on Prediction of Heart Disease Using Data Mining Technique

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Abstract - Prediction of heart disease is most complicated and challenging task in the field of medical science. Heart disease is the most threatening one among various diseases as it can not be detected easily. Bad clinical decisions would cause death of a patient. In our project the heart disease can be detected by using classifier. K-means clustering algorithm is used for the normalizing the data and trained label data set is detected by classifier. Prediction of heart diseases would be carried out by using multilayer perceptron neural network. The neural network in the system accepts clinical features as input and it is trained using clustering algorithm to predict that there is presence or absence of heart disease in the patient with highest accuracy of 98% comparative to other system. By applying data mining techniques, valuable knowledge can be extracted from the health care system. After prediction of heart disease the result of patient can be check by using Android Application. We propose efficient ANN algorithm hybrid with the back propagation technique approach for heart disease prediction. So there is necessity of creating an excellent project which will help practitioners predict the heart disease before it occurs.

Index Terms – Heart diseases prediction, ANN Classifier, K-Means Clustering, Back Propagation, Multilayer Perceptron.

I. INTRODUCTION

Prediction of heart diseases is most complicated and challenging task in the field of the medical science. Heart is one of the most common reason of death in India or other Asian countries. In 2003 approx 17.3 million people died all over globe and out of this, 10 million were only due to coronary heart diseases. Along without changing lifestyle there are many such factors such as smoking, alcohol, obesity, high blood pressure, diabetes etc. which are responsible for the risk of having heart problem.

However, with the recent studies, with the introduction of artificial intelligence and medical sciences, we can actually help in preventing any such kind of disease. For making a good decision, machine learning helps in extracting relevant data from huge database which are available in hospital. Various kind of techniques which have been applied in the prediction of a heart diseases or classification has been discussed and a proposed methodology of hybrid technique has been given which can be implemented in future to have an accuracy of almost 100% or least error.

In today's world, large number of population is suffering from different types of heart diseases and the count of patients suffering and dying from these disease is increasing day by day. So there is a need of accurate and early detection of heart disease with proper and adequate treatment which can save the life of many patients. But unfortunately, due to the complicated processes and different symptoms and pathological tests the correct diagnosis of heart diseases is a difficult task and causes delay in the proper treatment. Hence, there is a need to develop the prediction systems for heart disease which can help the medical experts in the early and accurate diagnosis of heart disease.

II. LITERATURE SURVEY

In this paper data mining technique are helpful in extracting and analyzing the complicated medical data using various kind techniques. Researchers have been applying various techniques of machine learning such as artificial neural network, BP[Back Propagation Algorithm] genetic Algorithm optimization purpose.[7]

k-means clustering algorithm used for the prediction of the heart diseases. It is a method of cluster analysis which aims to partition 'n' observations to 'k' clusters.[6]

In the system of heart diseases prediction,multilayer perceptron architecture of neural network is used.Prediction system gives the improved result with highest accuracy of 98.58% for 20 neurons in hidden layer with same Cleveland heart diseases database. Decision supports system with improved multilayer perceptron.[3]

This algorithm is generally used to train multilayer perceptron and many other neural networks. In back-propagation algorithm, the output obtained is compared with the target or expected output and the error is computed. This computed error is then again given to the neural network (fed back or back propagated) and weights are adjusted using this error so that the resulting output will get closer to the target or expected output. This process is repeated for number of times such that at each iteration the error value gets reduced and the output gets more and more closer to the target or expected output. This process is known as "training".[5]

The Back propagation algorithm was used to train the ANN architecture and the same had been tested for the various categories of stroke disease. [8]

III. METHODOLOGY

In the system for heart disease prediction, multilayer perceptron architecture of neural network is used. The system consists of two steps, in the first step 13 clinical attributes are accepted as input and then the training of the network is done with training data by back propagation learning algorithm[11].

A. Multilayer Perceptron Neural Network

The multilayer perceptron neural network, as its name indicates that it is made up of multiple layers. The single layer perceptron solve only linearly separable problems but many of the complex problems are not linearly separable so to solve such problems one or more layers are added in single layer perceptron hence it is known as multilayer perceptron. Multilayer perceptron network is known as feed forward neural network having one or more hidden layers as shown in Fig.1.They are generally used for pattern recognition, classification of input patterns, prediction based on the input information and approximation.

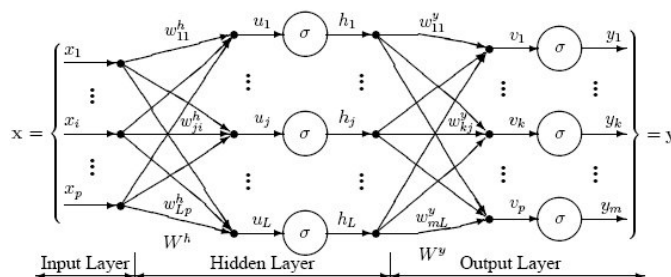


Fig. 1. Multi-layer Perceptron Neural Network Architecture

It is independent of the orientation and size of the image. Color histogram is the most popular method for extracting the color information from the image. It gives the information about distribution of different colors that are present in an image. In case of digital images, histogram is the number of pixels that have colors values in each of a fixed list of color ranges that cover the image's color space. The color histogram can be built for any type of color space, but it is often used for three-dimensional spaces like RGB or HSV. In case of monochromatic images, the term intensity histogram may be used instead [1].

Above network have an input layer with three neurons, one hidden layer(in the middle) with three neurons and an output layer with three neurons [12].

- **Input Layer** - The input layer accepts the input vector $(x_1 \dots x_p)$ and standardizes the values of each variable in the range of -1 to 1. Then the distribution of these standardized values along with constant input called bias of value 1 is given

to each hidden layer neurons by input layer this ICICES2014 - S.A.Engineering College, Chennai, Tamil Nadu, India ISBN No.978-1-4799-3834-6/14/\$31.00©2014 IEEE bias value is then multiplied by a weight and added to the sum that is going into the neuron.

- **Hidden Layer** - At each neuron in the hidden layer, a weight (w_{ji}) is multiplied to the value from each input neuron. Then a combined value u_j is produced by adding the resulting weighted values from each hidden layer neuron. This weighted sum(u_j) is then given to the a transfer function ,producing the outputs of value h_j . The combined outputs obtained from the hidden layer neurons are then given to the neurons in output layer.

- **Output Layer** - At each output layer neuron weight (w_{kj}) is multiplied to the value that is obtained from each hidden layer neuron, and then a combined value v_j is produced by adding the resulting weighted values. The weighted sum (v_j) is then given to the transfer function, which outputs a value y_k . The y values are the outputs of the network.

B. Back-Propagation Network

The back-propagation algorithm is the popular algorithm for the training of the neural network. This algorithm is generally used to train multilayer perceptron and many other neural networks. In back-propagation algorithm, the output obtained is compared with the target or expected output and the error is computed. This computed error is then again given to the neural network (fed back or back propagated) and weights are adjusted using this error so that the resulting output will get closer to the target or expected output. This process is repeated for number of times such that at each iteration the error value gets reduced and the output gets more and more closer to the target or expected output. This process is known as "training" of neural network.

In this prediction system the Cleveland heart disease database is used to fed the input to neural network. The network is having three layers and feed forward neural network model. The back propagation learning algorithm with learning rate of momentum and adaptive learning is used to train the neural network. In the input layer of the network there are 13 neurons that accept the 13 values of clinical information from the heart disease database. The hidden layer neurons can be varied in order to reduce error and increase accuracy and the output layer consists of single neuron that indicates whether the heart disease is present or absent.

VI. CONCLUSION

Heart disease is one of the leading causes of death worldwide and the early prediction of heart disease is important. Instead of going for a number of tests, predicting heart disease with less number of attributes is a challenging task in Data Mining. Neural Network with training data is a good for disease prediction in early stage and the good performance of the system can be obtained by preprocessed and normalized dataset. The neural network in system accepts clinical features as input and it is trained using clustering algorithm to predict that there is presence or absence of heart disease in the patient with highest accuracy of 98 % comparative to other system. The classification accuracy can be improved by reduction in features. From the analysis it is concluded that, data mining plays a major role in heart disease classification. The overall objective is to study the various data mining techniques available to predict the heart disease and to compare them to find the best method of prediction. After prediction of heart disease the result of patient can be check by using Android Application.

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