
HEART DISEASE PREDICTION USING ARTIFICIAL NEURAL NETWORK

Authors: Niti Guru, Anil Dahiya, Navin Rajpal

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Abstract:

Mortality rate increases all over the world on daily basis. The reasons for this could be increase in the numbers of patient with cardiovascular disease. When considering death rates and large number of people who suffers from heart disease, it is revealed how important early diagnosis of heart disease. Traditional way of predicting Heart disease is doctor's examination or number of medical tests such as ECG, Stress Test, and Heart MRI etc. Nowadays, Health care industry contains huge amount of health care data, which contains hidden information. This hidden information is useful for making effective decisions. Computer based information along with advanced Data mining techniques are used for appropriate results. Neural network is widely used tool for predicting Heart disease diagnosis. In this paper, a heart disease prediction system which uses artificial neural network backpropagation algorithm is proposed. 13 clinical features were used as input for the neural network and then the neural network was trained with backpropagation algorithm to predict absence or presence of heart disease with accuracy of 95%

Introduction:

Heart is made up of various Nerves and muscles. Any failure or defect of heart may lead to sudden death. Nowadays, in the world, Heart disease is the major cause of deaths. The World Health Organization (WHO) 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. This is one of the reasons why researcher has focus more in designing intelligent system that can be used to diagnose heart diseases with high accuracy, to avoid misdiagnosis. Besides, many people are living with heart disease without awareness. If heart disease could be predicted before, lots of patient deaths would be prevented and also a more accurate and efficient treatment way could be provided. Predication should be done to reduce risk of Heart disease. Diagnosis is usually based on signs, symptoms and physical examination of a patient. Almost all the doctors are predicting heart disease by learning and experience. Developing a medical diagnosis system based on machine learning for prediction of heart disease provides more accurate diagnosis than traditional way and reduces cost of treatment. In this paper, prediction of heart disease by an automated medical diagnosis system based on machine learning is proposed to satisfy this need. Backpropagation Algorithm which is commonly used Artificial Neural Network learning methodology was used for the prediction system. This system can help in diagnosing disease with less medical tests & effective treatments.

Methodology:

The heart is important organ of human body part. It is nothing more than a pump, which pumps blood through the body. If circulation of blood in body is inefficient the osrgans like brain suffer and if heart stops working altogether, death occurs within minutes. Life is completely dependent on efficient working of the heart. The term Heart disease refers to disease of heart & blood vessel system within it. A number of factors have been shown that increases the risk of Heart disease • Family history • Smoking • Poor diet • High blood pressure • High blood cholesterol • Obesity • Physical inactivity • Hyper tension Factors like these are used to analyse the Heart disease. In many cases, diagnosis is generally based on patient's current test results & doctor's experience. Thus the diagnosis is a complex task that requires much experience & high skill. A. Artificial Neural Networks: An ANN also called as neural network is a mathematical model based

on biological neural networks. Artificial neural network is based on observation of a human brain. Human brain is very complicated web of neurons. Neuron has axons, dendrites and synapses. The designed ANN

This dataset was taken from the UCI machine learning repository. The heart disease dataset is made up of 75 raw features from which 13 features were published [11]. These features are very vital in the diagnosis of heart diseases. The features include fasting blood sugar test which must indicate $< 120\text{mg / dl}$ for a patient with absent test result and test result of $>120\text{mg / dl}$ for a patient that has heart disease. Also, a patient that has serum cholesterol greater than 180mg/dl is also considered as heart disease present.

The 13 features considered in this research work are stated below: Feature 1: Age Feature 2: Sex Feature 3: Chest pain type 4 values Feature 4: Resting blood pressure Feature 5: Serum cholesterol in mg/dl Feature 6: Fasting blood sugar $>120\text{mg / dl}$ Feature 7: Resting electrocardiographic result (value 0, 1, 2) Feature 8: Maximum heart rate achieved Feature 9: Exercise induced angina Feature 10: family history. Feature 11: The slope of the peak exercise ST segment Feature 12: Diagnosis

Conclusion:

In this research paper, we have presented Heart Disease Prediction System (HDPS) using data mining and Artificial Neural Network (ANN) techniques. From the ANN, a multilayer perceptron neural network along with back propagation algorithm is used to develop the system. Because MLPNN model proves the better results and helps the domain experts and even person related with the field to plan for a better diagnose and provide the patient with early diagnosis results as it performs realistically well even without retraining. The experimental result shows that using neural networks the system predicts Heart disease with nearly 100% accuracy.