



## Analyse the Heart Disease and Diabetes Using Artificial Neural Networks

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**Abstract**— Heart disease and diabetes are the most leading cause of the death. Diabetes is also a cause of heart attack. Cardiovascular system is one such hazard. About 80% of deaths occurred in low- and Middle income countries and 25 per cent of them in the age group of 26- 69 years occur because of heart diseases. To precisely diagnose the persons' disease condition it is essential to use apposite methods that minimize the errors in diagnosis. The patients are at risk for the vascular complications and they are not aware of this disease. Premature cure of diabetes and allied cardiovascular risk factors may reduce the incident of these complications. Neural Networks are much efficient in classification of the data. Accuracy is much important in the field of medical science. Using the neural networks multi layer perceptron classification for choosing the best and accurate classification model researchers get much accuracy.

**Keywords**- Heart Disease, Diabetes, ANN's, Performance Analysis

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### I. INTRODUCTION

This part provides the introduction of heart disease and diabetes with data mining.

#### Heart Disease

Heart Disease is also known as cardiovascular disease which involves heart and blood vessels [1].

Heart attack or Myocardial Infarction is an unending damage of the heart muscle. MI occurs when blood is not supplied properly to the heart and an heart muscle is damaged because it is not receiving enough oxygen. Usually this is because one of the [coronary arteries](#) that supplies blood to the heart and heart makes a stumbling block due to an [unstable build up](#) of [white blood cells](#), [cholesterol and fat](#). According to Centre of Disease control and prevention Heart Disease is second cause of death after Cancer .More than half of the deaths occurred due to heart disease in 2009 were in men [2].

#### Diabetes

Diabetes is a metabolic disease which occurred due to high level of the blood sugar. Diabetes occurred when cell body not properly responding to the insulin. There are three foremost types of diabetes are : “ Type I Diabetes” : this occurred when body is not producing enough insulin. “Type II diabetes” : In this the cells of the body not respond well to the insulin. And the last and third type of Diabetes is “Gestational Diabetes” is occurred in a pregnant women without any heredity producing high level of glucose [3][4] .

Various fields connected with medical services like prediction of efficiency of surgical process, medical tests, medication, and the discovery of relationships among clinical and diagnosis data as well as to employ Data Mining methodologies [5]. Data mining techniques are used in diagnosis and health care applications because of their predictive nature. Data mining have an ability to extract data using algorithms and extract patterns from the historical data [6]. In the field of medical science data mining is a complicated task that needs to be executed accurately and efficiently.

### II. ARTIFICIAL NEURAL NETWORKS

Neural networks are similar to the biological neuron. Neural Networks are created in 1943 by McCulloch and Walter Pitts. Artificial Neural Networks is a computational model. Artificial Neural Networks is an interconnected collection of nodes is also known as neurons. ANN's have three layer architecture First layer is Input Layer which is connected to the environment and takes input from the environment. Second layer is Hidden layer which can perform computation on the data and data is propagated to successive layers and third layer is the output layer which provides the output of the network. ANN's have different types. Most commonly and widely used is multilayer neural network. ANN's can be used for the prophecy of the new independent input data. ANN's can train the network and provide the accurate output. Artificial Neural Networks have a considerable characteristics is Fault tolerance, Learning ability, adaptability. [7]

Computers are best in calculations, take input and work on the given instructions but Artificial Neural Networks compose their own rules and provide effective decision, so that the accurate output is provided.

#### Artificial Neural Network (ANN) Used in Heart Disease and Diabetes

Artificial neural networks (ANNs) are computational [models](#) stimulated by an animal's [central nervous systems](#) (in particular the [brain](#)) which is capable of [machine learning](#) as well as [pattern recognition](#). Artificial neural networks are interconnected collection of "[neurons](#)" which can compute values from inputs. Artificial neural networks can analyse

medical data for finding the best risks strategy. The aspire of this studied article is to develop an Artificial Neural Network based diagnostic model. The prelude studies have discovered that this network is more accurate than physicians in identifying acute myocardial infarction in patients presenting to the emergency department with anterior chest pain.

Here explanation of the work done by various researchers and scientists on the medical diagnosing system. A variety of artificial intelligence techniques such as artificial neural network and fuzzy logic are useful for the classification problems in the field of medical system [8].

[9] this paper presents the comparative study of various diseases. [10] Describes that the neural networks is trained using back propagation algorithm for the classification task of heart disease data set. The paper presents the classification model of Neural Networks is feed forward back propagation which distinguishes between infected and non-infected categories of the person [11]. [12] Training of multilayer neural network by LM algorithm and probabilistic neural network a comparative study is done on Pima Indian diabetes disease diagnostic.[13]represents a significant tool. ANN's have ability to perform large amount of data and reduces the time to diagnosis. ANN's proves the satisfactory diagnosis of various diseases. A genetic algorithm based model is constructed for the patients of mainly diabetic for accessing and predicting the risk of heart attack and stroke [14].For the prediction of the heart disease using three data mining techniques like Neural Networks, Decision Tree and Naïve bayes. And presents an associative classification which integrates association rules and achieves highest accuracy [15][16] Here the paper presents the prediction of diabetes and its type then analyse the results and compare the results with the networks changing parameters in the neural networks. [17] Paper describes the two techniques Artificial Intelligence and Neural Networks. In future Artificial Intelligence will try to make machines and computers more stylish. It is expected that in future machines will have basic common sense like human beings.[18] presents the data mining used in the medical field. From the above literature survey we analysed that the pre-processing using the ANN's classification of the medical data will result the predicted model.

### III. PERFORMANCE ANALYSIS

The performance of the prognostic model is analysed using the following criteria:

If a classification model is trained the predictive model will present the best accuracy.

Accuracy =  $(TP+TN) / (TP+TN+FP+FN)$

Where TP is the number of true positive

TN is the number of true negative

FP is the number of false positive

FN is the number of false negative

Area under receiver-operator characteristics curve (ROC). The curve that has a superior area under curve is better than the one that has a minor area under curve. The specificity is the probability that a test is negative for patients without diabetes and heart disease.

### IV. CONCLUSIONS

The concluded result is that the diseases like heart disease, diabetes, breast cancer are the perilous diseases which escort to the death. Artificial neural networks offer a dominant tool to doctors for analyzing the model. If more data is used by the network, it will make the network more intelligent and gives much accurate results.

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