Scientific Journal Impact Factor (SJIF) : 3.518
International Journal of Modern Trends in Engineering and Research
ISSN (ONLINE) : 2349 - 9745 ISSN (PRINT) : 2393 - 8161

A SOM BASED HEART ATTACK PREDICTION SYSTEM USING ULK(Unified Learning Kit)

[1] D.Sujithra, [2]A.Indhu,[3] V.Nithya and [4]M.Ashok
[1,2,3]Information Technology, Rajalakshmi Institute of Technology
[4]Sr.Aessistance professor Information Technology, Rajalakshmi Institute of Technology

Abstract — The Many times people feel uneasiness, pain and they do not know the cause nor do they intend to consult a doctor to know about the status of their health. Because of this complexity, there exists a significant amount of interest among the medical professionals and Researchers regarding the efficient and accurate prediction of heart attack. In this Paper, Self Organized Mapping is adopted for heart attack prediction that can assist the patients and their fellowships in predicting the status of heart attack of the patient by analyzing their daily ECG records, Blood Test results of the patient and the system is implemented in C Platform and trained using ULK (Unified Learning Kit) in which the prediction is classified as follows. Firstly, the Mild attack. Secondly, the Moderate attack and finally Severe attack otherwise exists the Normal State.

Keywords—Unified Learning Kit (ULK), Electro Cardio Gram (ECG), Global System for Mobile (GSM), Heart attack prediction, Back Propagation Network (BPN), Self Organized Mapping (SOM)

I. INTRODUCTION

The Survey says that 12 million deaths occur worldwide every year due to the Heart diseases. Heart Attack remains the biggest cause of deaths for the last two decades .There are number of factors which increases risk of Heart disease some of the important factors are Blood pressure , Blood Sugar , Cholesterol and also due to the Family history of heart disease , Obesity , Lack of physical exercise and also due to poor clinical decisions . Because not only human intelligence is enough for proper diagnosis and number of difficulties will arrive during diagnosis of heart disease such as result will be less accurate, and it take more time for prediction . Hence to overcome this problem , now a day's many computer related technology and machine learning technology are used to develop software to assist the doctors in making decision of heart attack in the early stage and it is very useful for the health care industries. The diagnosis of heart attack depends on clinical and pathological data called as data sets (i.e.) the set of data or information which contains the patient reports. In this paper , Experiments have been performed using UTLP (Unified Technology Learning Platform) or ULK (Unified Learning Kit).The remaining of the paper is structured as Section II describes the existing system of Heart attack prediction system. Section III illustrates the proposed system of BPN Based Heart attack prediction system. Section IV illustrates the experimental analysis of existing and proposed system and finally conclusion is demonstrated in section V.

II. EXISTING SYSTEM

The Back propagation, developed by McClelland and Rumelhart in 1988 is one of the training methods which is used as a tool in the neural network for solving a wide variety of problems. It is simply a gradient descent method to minimize the total squared error of the output. Applications using Back propagation can be found virtually in every field that uses neural network for problem solving, which involves mapping a given set of inputs to a specified set of target outputs. The aim is to train the network to achieve a balance between the ability to respond correctly to the input pattern that is used for training, but not identical.

The training of a network by Back propagation [7] involves three stages: The Applying of the input pattern, the calculation and back propagation of the associated error, and the adjustment of weight.

ARCHITECTURE OF BPN:

A multi-layer neural network with one layer of input units(X units), hidden units(Z units), the output units(Y units). The output units and the hidden units also may have biases. The bias on a typical output unit (Y_{k1}) is denoted by (W_{0k1}), the bias on a typical hidden unit Z_{j1} is denoted by V_{0j1}. These bias terms act like weights on connections from units whose output is always 1.

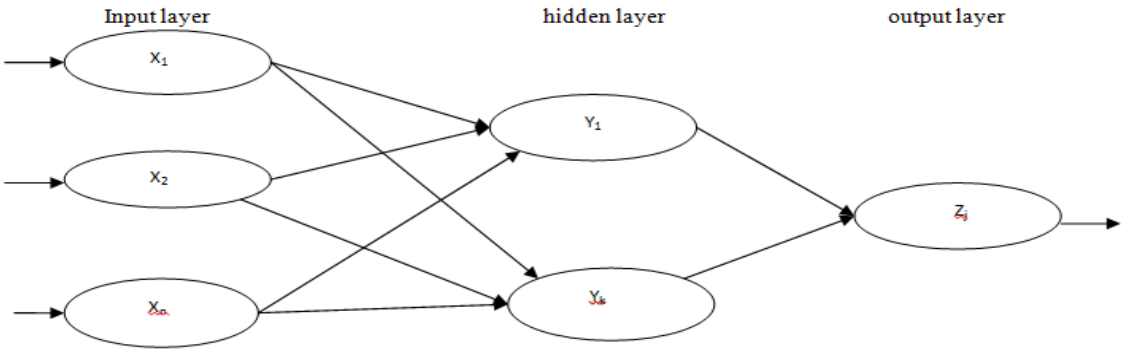

Fig 2.1 Back propagation Neural Network

BACKPROPAGATION AL

During feed forward, each input unit (X_i) receives an input signal and pass this signal to the each of the nodes in the hidden units $Z_{1....}Z_p$ (no.of units). Each hidden unit then computes its activation and sends its signal (Z_j) to each of the nodes in the output unit. Then each of the output unit (Y_k) computes its activation function Y_k to form the response of the network for the given input pattern.

Each output units compares its computed activation Y_k with its target value T_k to determine the error for that pattern with respective to that unit. With this error, the factor δk (k=1….m) is computed by weight updation and applying activation function. δ_k is used to distribute the error at output unit Y_k back to all units in the previous layer(the hidden units that are connected to Y_k) the procedure is continued till the target output value is achieved. it is also used later to update the weights between the hidden and output layer. In a similar way, the factor δ_j is computed for each hidden unit Z_j of the network.

After computation of all the δ factors, the weights for all layers are adjusted simultaneously(i.e) updation of weight occurs. The adjustment to weight W_{jk} (from hidden unit Z_j to output unit Y_k) is based on the factor δ_k and the activation Z_j of the hidden unit Z_j. The adjustment to the weight V_{ij} (from input unit X_i to hidden unit Z_j) is based on the factor δ_j and activation X_i of the input unit.

Activation function => $f_1(x) = 1/(1+\exp(-x))$.

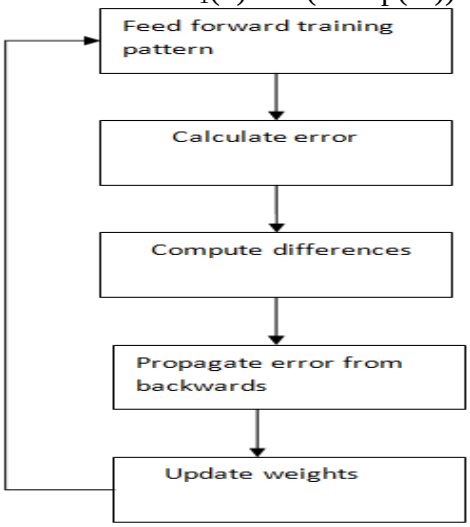

Fig 2.2 BPN algorithm working Function

III. PROPOSED SYSTEM

To improvise the existing system, we go for self-organizing maps [3]. The self-organizing map is also known =as topology preserving maps and shortly refers as SOM. Assume a topological structure among the cluster units. There are various cluster units m, arranged in a one or two dimensional array, and the input signals are n.

The weight vector for a cluster unit serves as an paradigm of the input patterns associated with that cluster. During the self-organization process, the winner unit is determined by matching the cluster unit whose weight vector matches the input pattern most closely (typically, the square of the minimum Euclidean distance, D(j) as per the algorithm) is chosen as the winner unit. The winning unit and its neighboring units (the network structure of the cluster units) update their weights. The weight vectors of neighboring units are not, in general similar to the input pattern. For example, for a linear array of cluster units, the neighborhood of radius R around cluster units J consists of all units j such that max(1,J-R) <= j <= min(J+R,m).

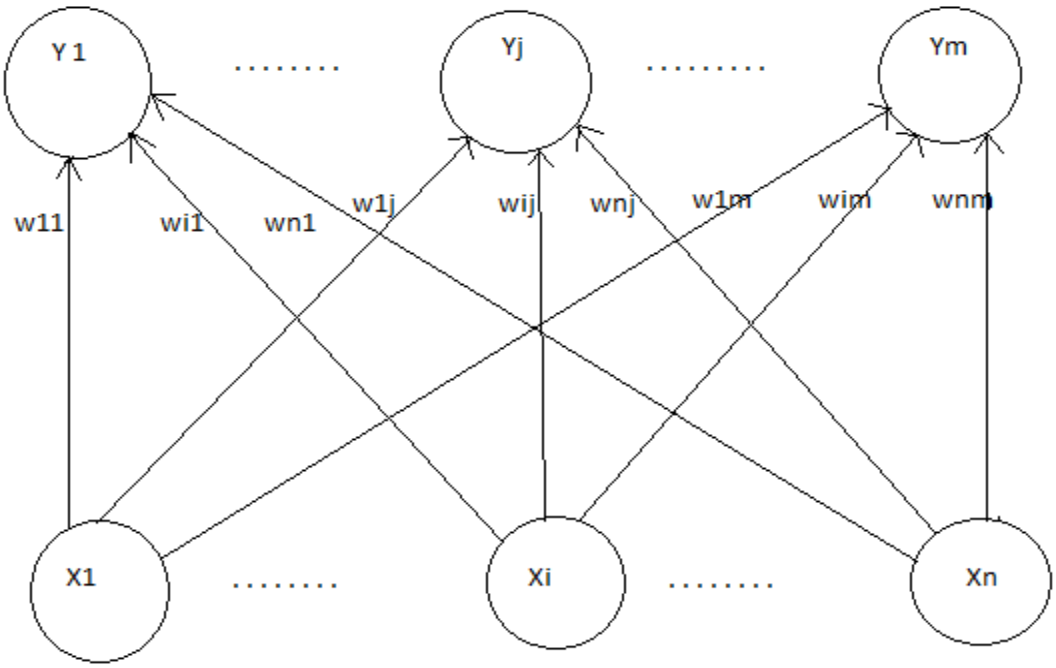

Fig 3.1 Self Organizing Map Network

ALGORITHM:

Step 0: Initialize weights Wij of the network.
Set topological neighborhood parameter.
Set Learning rate parameters.
Step 1: While end condition is false, repeat steps 2-8.
Step 2: For each input vector x1…xi….xn, proceed step 3-5.
Step 3: For each j, compute:
$D(j) = \sum i (Wij – xi)^2$.
Step 4: Find index j, such that D(j) is minimum.
Step 5: For all units j within the specified neighborhood of j, and for all i :
$Wij(new) = Wij(old) + \alpha[xi – Wij(old)]$ (i.e) new weight is calculated by subtracting the old weight with input units and adding them with learning rate.
Step 6: Update Learning rate.
Step 7: Reduce radius of neighborhood units of the network at specified times.
Step 8: Test stopping condition.

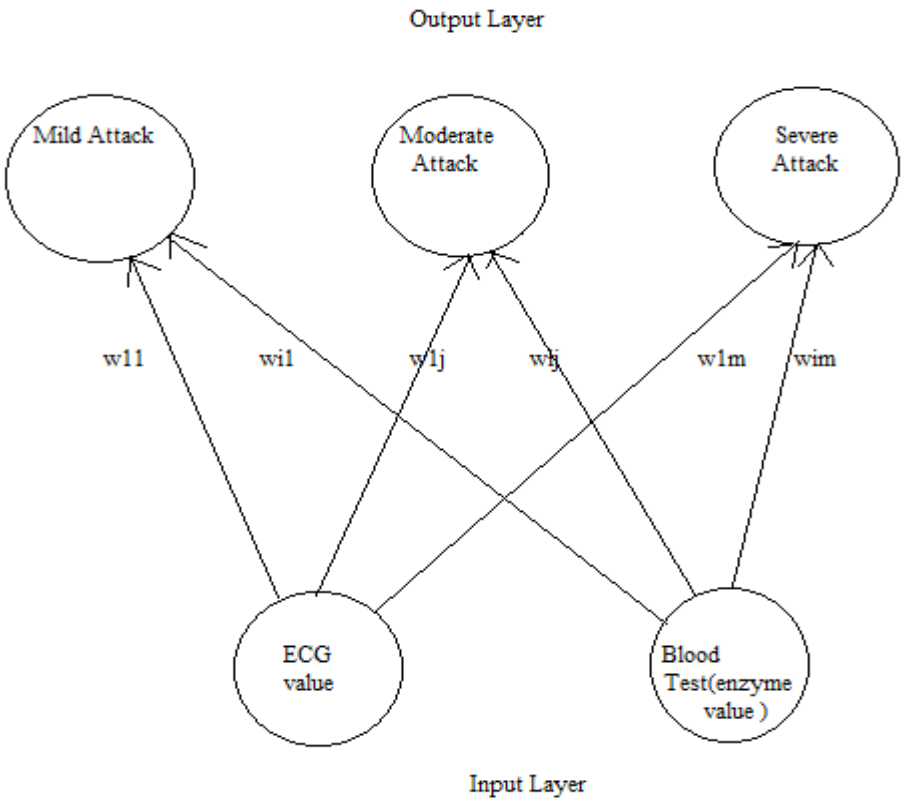

Fig 3.2: A SOM model for heart attack prediction system

In this paper, the network structure of SOM model for Heart Attack Prediction System is represented in Fig 3.2. The major factors for predicting the heart attack such as ECG[5] and Blood Test are given as the input to the Input Layer and SOM algorithm is applied for the input parameters and after completing various iterations the result such as mild, moderate or severe attack is generated in Output Layer. The generated output is implemented using ULK (refer fig 3.3) and the classification of the heart attack is determined by enlightening the led, displaying characters on the kit and sending a text message to the patients relatives with the help of Global System for Mobile (GSM)[4] in the case of mild, minor and severe attack respectively.

The GSM technique is used for sending message for the patient relatives if the prediction status represents severe attack in ULK. In this paper we use GSM/GPRS port interface, Character Display and LED's of the ULK for implementing the result.

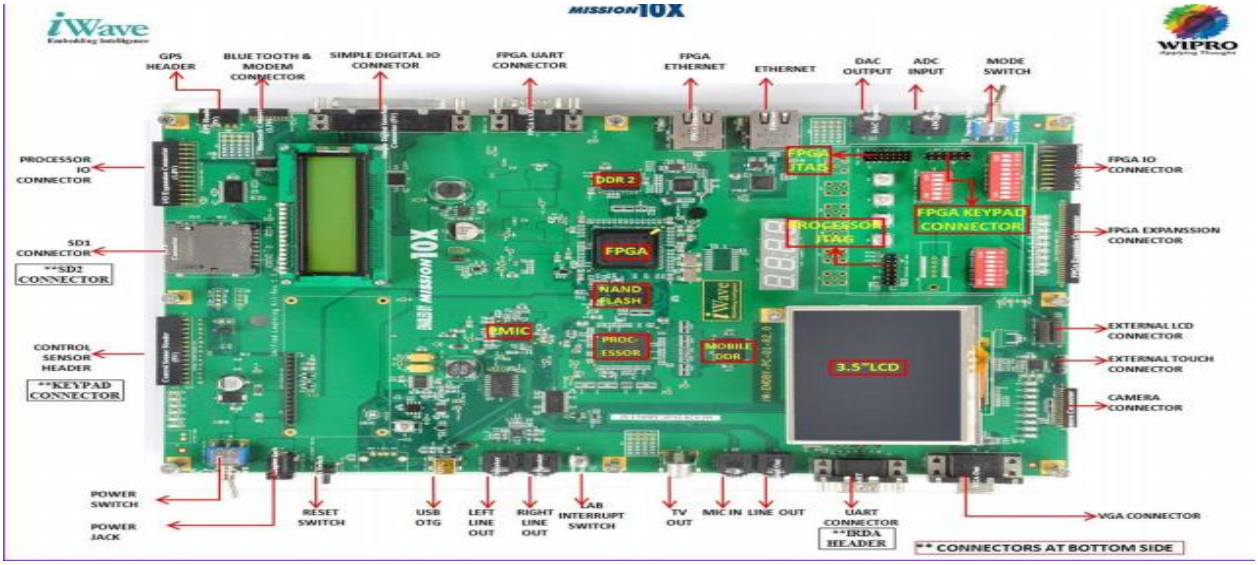

Fig 3.3 Pictorial representation of unified learning kit (ULK)

IV. EXPERIMENTAL ANALYSIS

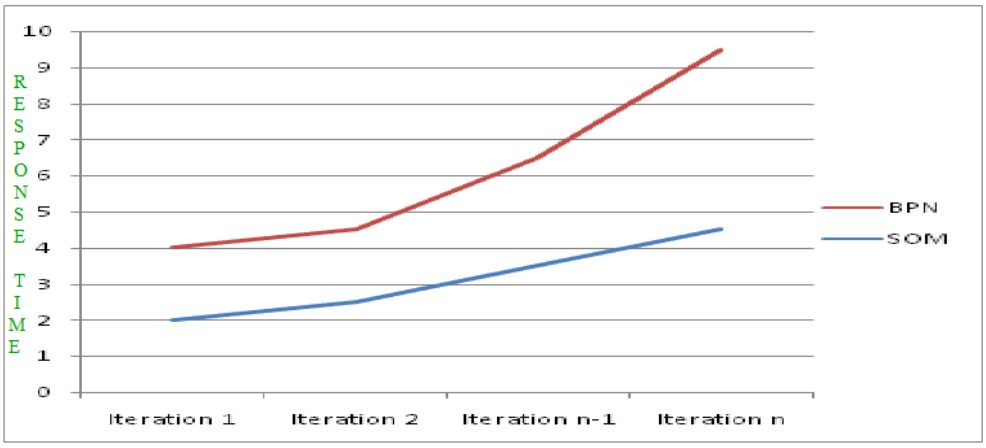

Fig 4.1 Experimental Analysis

V. CONCLUSION

In this paper, we have presented Heart attack prediction system using Self Organized mapping algorithm with computer aided technique which helps the physician as a tool for predicting the heart attack. The execution is implemented with the ULK; it plays a major role in classifying the heart attack such as normal state, mild, moderate or severe attacks. The experimental result shows that using Back propagation network algorithm [6], it takes more number of computations to generate the result whereas in the proposed system using Self Organized Mapping algorithm, it is used to clarify relations in a complex set of data and its accuracy level is around 99.5% and the System can be implemented in future through Simulated Annealing.

REFERENCE

[1] Daniel Larose, Discovering Knowledge in Data: An Introduction to Data Mining, Wiley, Hoboken, NJ, 2005.
[2] MA.Jabbar, B.L.Deekshatulu and Priti Chandra.: An evolutionary algorithm for heart disease prediction, ICIP, CCIS 292 PP 378- 389, Springer-Verlag (2012).
[3] Heart Disease Diagnosis Using Multiple Kohenen Self Organizing Maps,Volume: 03.
[4] B.Jyosthna, R.GiriPrasad, "Medical Emergency Assistance System using GSM", International Journal of Scientific Engineering and Research (IJSER) SN (Online): 2347-3878, Volume 1, Issue 1, September 2013.
[5] Ketaki N.Patil, P.C.Bhaskar, "Transmission of Arm Based Real Time ECG for Monitoring Remotely Located Patient "international journal of Research in Engineering and Technology eISSN: 2319-1163, pISSN: 2321-7308, Volume: 03 Issue: 04, Apr-2014.
[6] Comparative Study of Back Propagation Learning Algorithms for Neural Networks Saduf, Mohd Arif Wani Dept.of Computer Sciences University of Kashmir Srinagar, j&k, India.
[7] A.Indhu,V.Nithya,D.Sujithra,M.Ashok,"A BPN based heart attack prediction system using ULK(Unified Learning Kit)- International Journal of Modern Trends in Engineering and Research,Volume: 03 Issue: 02,Feb-2016.

