



Effective Data Mining Through Neural Network

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Abstract :- With the continuous development of database technology and the extensive applications of database management system, the data volume stored in database increases rapidly and in the large amounts of data much important information is hidden. If the information can be extracted from the database they will create a lot of potential profit for the companies, and the technology of mining information from the massive database is known as data mining. Data mining tools can forecast the future trends and activities to support the decision of people. For example, through analyzing the whole database system of the company the data mining tools can answer the problems such as “Which customer is most likely to respond to the e-mail marketing activities of our company, why”, and other similar problems. Some data mining tools can also resolve some traditional problems which consumed much time, this is because that they can rapidly browse the entire database and find some useful information experts unnoticed.

Neural network is a parallel processing network which generated with simulating the image intuitive thinking of human, on the basis of the research of biological neural network, according to the features of biological neurons and neural network and by simplifying, summarizing and refining. It uses the idea of non-linear mapping, the method of parallel processing and the structure of the neural network itself to express the associated knowledge of input and output. Initially, the application of the neural network in data mining was not optimistic, and the main reasons are that the neural network has the defects of complex structure, poor interpretability and long training time. But its advantages such as high affordability to the noise data and low error rate, the continuously advancing and optimization of various network training algorithms, especially the continuously advancing and improvement of various network pruning algorithms and rules extracting algorithm, make the application of the neural network in the data mining increasingly favoured by the overwhelming majority of users. In this paper the data mining based on the neural network is researched in detail.

Keywords: Artificial neural network, Weight fact factor, Nerve cell, Pattern recognition, Node.

I INTRODUCTION

Artificial neural networks are inspired by the operation of the human brain. It is a model of the biological neuron as a circuit component to perform computational tasks. Artificial neural networks consist of a number of simple computing elements called neurons that are modeled after the human nerve cell. Each neuron receives a number of input signals and performs a simple operation on this set of inputs. The output of each neuron is fanned out to the inputs of other neurons. [8]

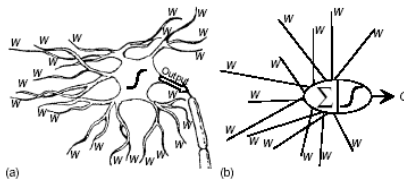


Figure 1 Human nerve system and its artificial equivalent

In Fig. 1 a human nerve cell, or neuron, (a) and its artificial equivalent (b) are sketched. The neuron receives a set of input signals via a number of tentacles or dendrites. At the tip of each dendrite the input signal is weighted with a factor w , which can be positive or negative. All the signals

from the dendrites are added in the cell body to contribute to a weighted sum of inputs of the neuron. If a weight is positive the corresponding input will have an excitatory influence on the weighted sum. With a negative weight, an input decreases the weighted sum and is inhibitory. In the cell body the weighted sum of inputs is compared to a threshold value. If the weighted sum is above this threshold, the neuron sends a signal via its output to all connected neurons. The threshold operation is essentially a nonlinear response function as is indicated in the figure with an S-shaped, sigmoid, curve. The function of a neuron can be described in mathematical form with:

$$O = F \left(\sum_i w_i \cdot I_i \right)$$

where, O is the output signal of the neuron and I_i are the input signals to the neuron, weighted with a factor w_i some nonlinear function representing the threshold operation on the weighted sum of inputs. [8].

II Training Of Artificial Neural Networks

1) *Supervised learning or Associative learning:* In which the network is trained by providing it with input and matching output patterns. These input-output pairs can be

provided by an external teacher, or by the system which contain neural network

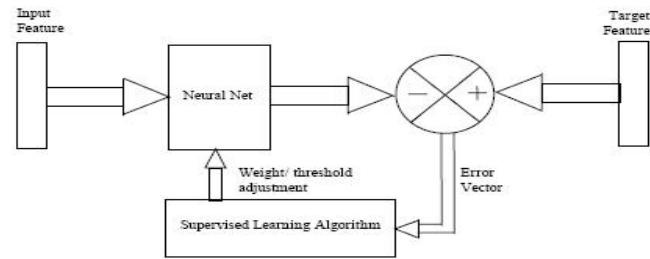


Figure 2 Example of supervised learning

2) *Unsupervised learning or Self-organization*: In which an (output) unit is trained to respond to clusters of pattern within the input. In this paradigm the system is supposed to discover statistically salient features of the input population.

3) *Reinforcement Learning*: This type of learning may be considered as an intermediate form of the above two types of learning. Here the learning Machine does some action on the environment & a feedback from environment.

III. Methods of Neural Network:

There are seven common methods and techniques of data mining which are the methods of statistical analysis, rough set, covering positive and rejecting inverse cases, formula found, fuzzy method, as well as visualization technology. Here, we focus on neural network method. Neural network method is used for classification, clustering, feature mining, prediction and pattern recognition. It imitates the neurons structure of animals, bases on the M-P model and Hebb learning rule, so in essence it is a distributed matrix structure. Through training data mining, the neural network Method gradually calculates (including repeated iteration or cumulative calculation) the weights the neural network c connected. The neural network model can be broadly divided into the following types.

1) *Recurrent neural network* : Recurrent neural networks that do contain feedback connections Contrary to feed forward neural network. It regards Hopfield discrete model and continuous representatives, and mainly used for associative memory and optimization calculation

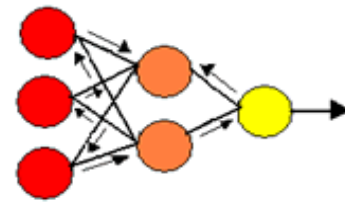


Figure 3 Example of recurrent neural network

2) *Feed forward neural network*: In this network, the information moves in only one direction, forward, from the input node through the hidden node to the output node. It mainly use in the area of pattern recognition and prediction.

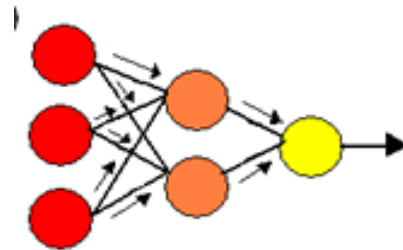


Figure 4 Example of back propagation network

IV. Back propagation Algorithm:

It is a common method of teaching artificial neural network how to perform a given task. The back propagation algorithm is used in layered feed forward ANN. This means that the artificial neuron are organized in layers and send their signal forward and then the errors are propagated backward. The back propagation algorithm uses supervised learning. Which means that we provide with example of input and output we want the network to compute than the error difference between actual and expected is calculated?

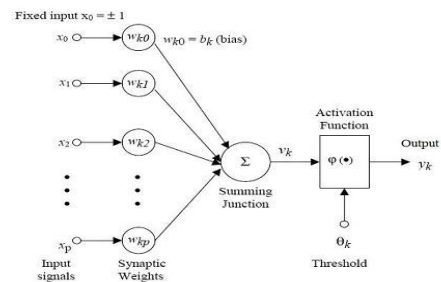


Figure 5 Example of Backpropagation algorithm.

Example:

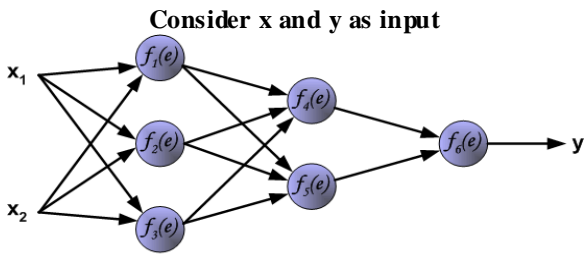


Figure 6

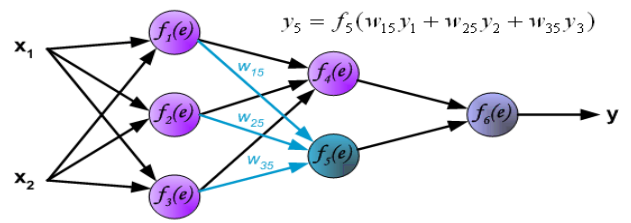


Figure 11

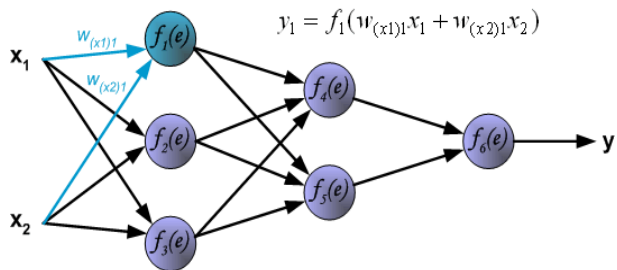


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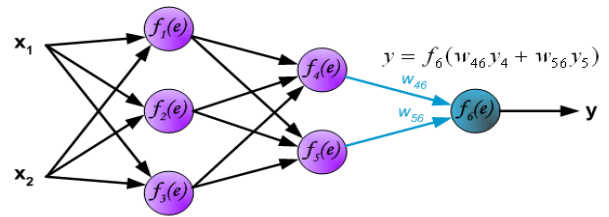


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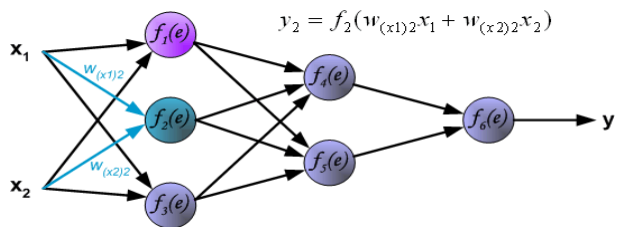


Figure 8

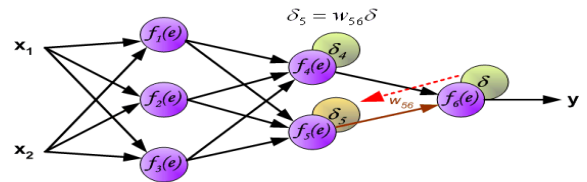


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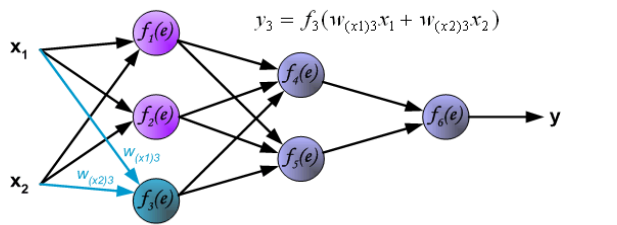


Figure 9

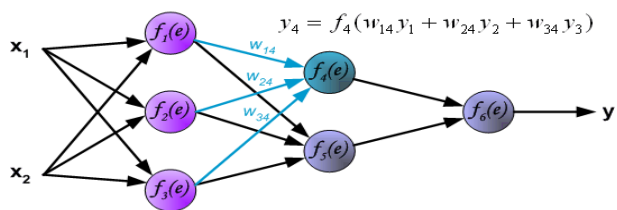
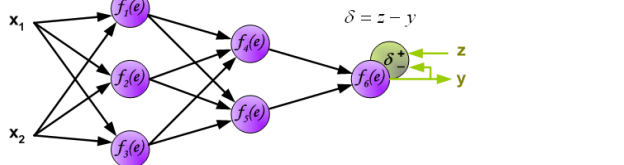


Figure 10

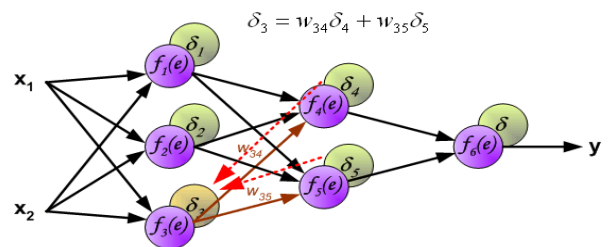


Figure 15

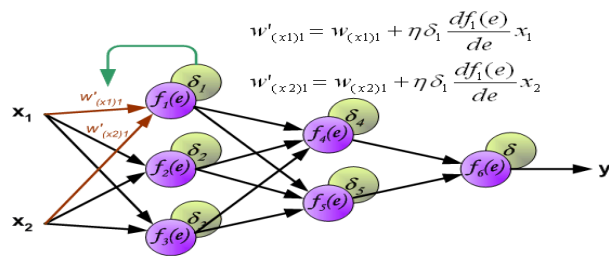


Figure 16

V. CONCLUSION

At present, data mining is a new and important area of research and neural network itself is useful for Solving the problems of data mining because its characteristic robustness, self organizing adaptive, parallel Processing, distributed storage and high degree of fault tolerance.

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