

# Analysis of Neural Network Algorithms in Data Mining

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**Abstract**—Data mining mean mine data from huge amount of data. Classification of every data is very slightly difficult task that can be solving by using different algorithms and models. Some of the technologies used are neural network, regression, and decision tree. In this paper focus on various Neural Network algorithms are helpful to classify and analyse the attack in an efficient manner and also comparative study of neural network algorithms and way to achieve the data mining based on neural network algorithms are also research.

**Keywords**—Artificial Neural Network (ANN), Back propagation, Feed forward.

## 1. Introduction

Data mining is the process of automatically discovering useful information in large data repositories. As data mining involves the uses of sophisticated data analysis tool to discover previously unknown valid pattern and relationship in large data set. These tools can also include various statistical model, mathematical algorithm and machine learning techniques. Especially, data mining consist of more than collecting and managing data. Some of techniques used are neural network and decision tree, advanced algorithm, nearest neighbour etc. This paper mainly focuses on neural networks, although neural network may have complex structure and long training time. NN have high acceptance ability for noisy data and high accuracy. Preferably in data mining using different NN algorithms such as multilayer perceptron, radical basic function, and logistic regression and voted perception. These entire NN based algorithm are implemented in WEKA data mining tool to evaluate the performance.

## 2. Neural Network

Neural network are non-linear statistical data modelling tools can be used to model complex relationship between input and output or to find patterns in data. NN are useful especially when there is no prior knowledge about the analysed data. The tool can include statistical model mathematical algorithm and machine learning.

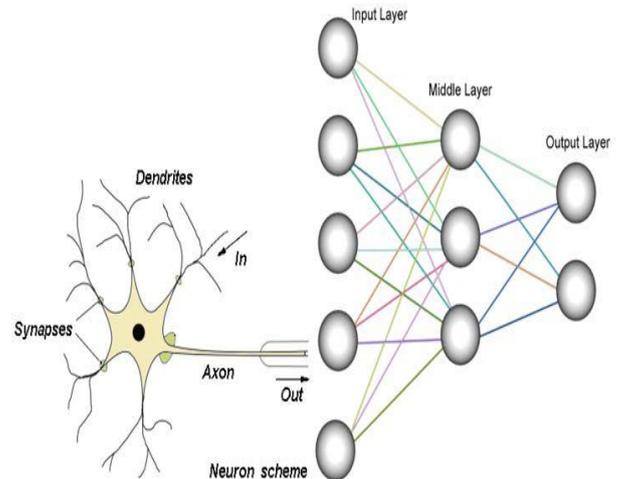


Fig. 1: General structure of neural network

Neural network computing is a key component of any data mining tool kit. Use of NN in data mining is a promising field of research especially given the ready availability of large mass of dataset and the reported ability of NN to detect relationship between a large numbers of variables. Data mining based on neural network is researched in clearly, and the technology and ways to achieve the data mining based on neural network are also researched. They have proven their predictive power through comparison with other statistical techniques. These algorithms are efficient and perform effective result by self adjusting nature. Researches show that a neural network performed better than conventional statistical approaches in real work application.

## 3. Neural network algorithms

In data mining , neural network classifier algorithm are used for classify the data in well-organized form, the major neural network algorithm are Multilayer Perceptron, RBF Network, Logistic Regression, Voted Perceptron. All these algorithms individually tested on a selected dataset and selected tool with data mining with respective algorithm which is already existing step of trained statistical method.

#### 4. Multilayer Perceptron

A multilayer perceptron that maps sets of input data onto a set of appropriate outputs. A MLP consists of more than one layer of nodes in a directed graph, with each layer completely connected to the next one. Other than the input node, each node is a neuron (or processing element) with a nonlinear activation function.

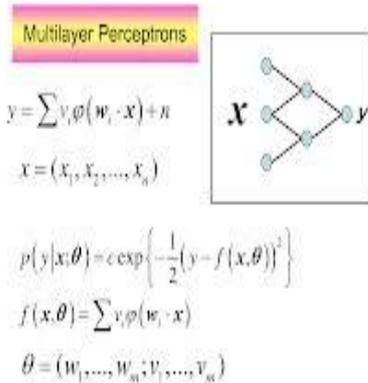


Fig.2: Training equation of multilayer perceptron

#### 4.1 RBF Network

A radial basis function network is an artificial neural network that uses radial basic function as activation function. The output of the network is a linear connection of radial basis function of input and neuron parameter. Radial basis function (RBF) networks typically have three layers: an input layer, a hidden layer with a non-linear RBF network accepted function and a linear output layer. The idea of Radial Basis Function (RBF) Networks derives from the theory of function approximation.

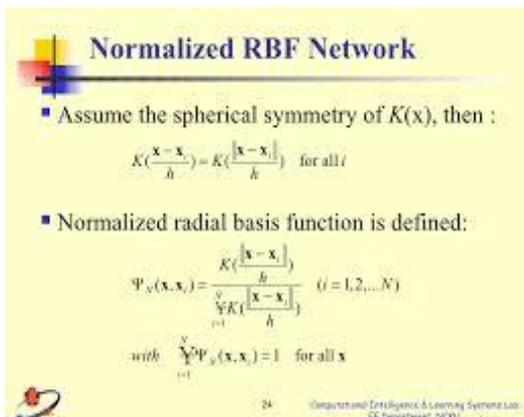


Fig.3: Training equation of RBF Network

#### 4.2 Voted perceptron

Voted Perceptron neural network is based on perceptron algorithm. Voted Perceptron neural network helps in interchange all misplaced values, and transforms nominal attributes into binary value. It helps in predicting the outcome in binary value. In voted perceptron, main information can be store during training and then use this elaborate information to generate better prediction on test the data.

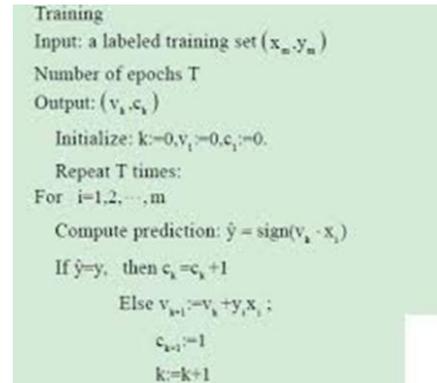


Fig.4: Training equation of voted perceptron

Predicting the outcome of a categorical dependent variable based on one or more dedication variables. The algorithm refers to causes where outcome can have three or more possible type. It measures the relationship between a categorical dependent variable and one or more independent variables. It can be single or multiple.

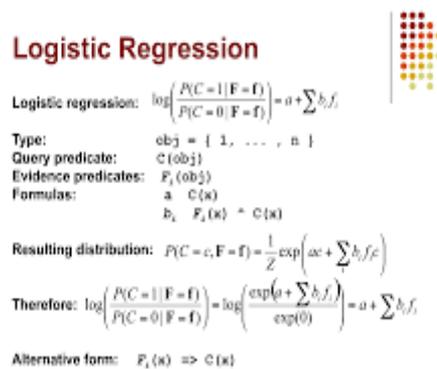


Fig.5: Training equation of logistic regression

#### 5. Methodology

To analysis the performance of neural network algorithm following step are implemented.

- At first, we have select the tool called as WEKA machine learning, which is allows users to identify hidden information from database and file system with simple to use option and visual interface.
- Second, we have to select the dataset called NSL KDD, which contain number of attributes, that are supportive for measure the attacks.
- Third, we have to select the algorithm; it can be select according to measure the detection rate at a time.
- Fourth, we have to test or check the algorithm separately, for measuring the accuracy.
- Finally, we have to evaluated and compared with each other algorithms.

As we follow the forward step to analysis the best algorithm among the 4 major different neural network algorithm and also to find the algorithm which is giving the highest accuracy data then all other.

### 6. Accuracy Analysis

To check the accuracy measure of the data available in data mining is analysis with a NN algorithm. Dataset has been tested with help of selected algorithm separately, for classifying the attack or for measure the accuracy.

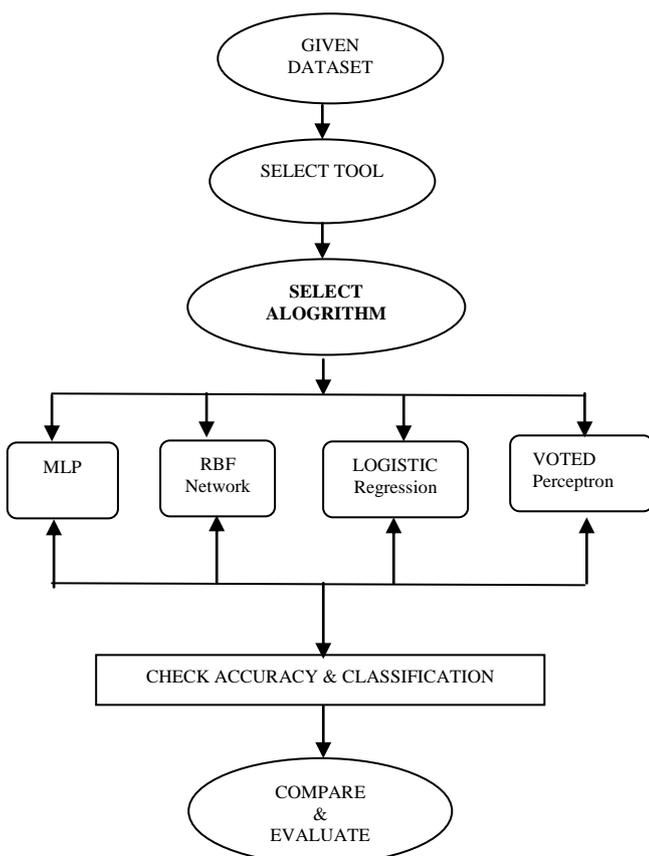


Fig.6: Flowchart of analysis of neural network in data mining

Table.1: percentage of accuracy, performance, error data for each algorithm

ALGORITHM	ACCURACY	PERFORMANCE	ERROR DATA
Multilayer Perceptron	94.94	89	5.05
Voted Perceptron	82.37	25	17.62
Logistic Regression	93.66	43	6.03
RBF Network	90.82	37	9.87

Table.1 clear show that percentage of accuracy, performance, error occurrence using the 4 major neural network algorithm and is result show that the multilayer perceptron high accuracy, performance and less error detection data available during analysis. As it also conclude that multilayer perception is highest accuracy data in analysis the data in data mining using neural network algorithms.

### 7. Evaluation

To validate the performance of the various NN Algorithms in data mining by implementing proposed algorithm in machine learning tool. After the classification of NN Algorithm in NSLKDD tested data set in WEKA tool, the performance is represented in following bar chart:

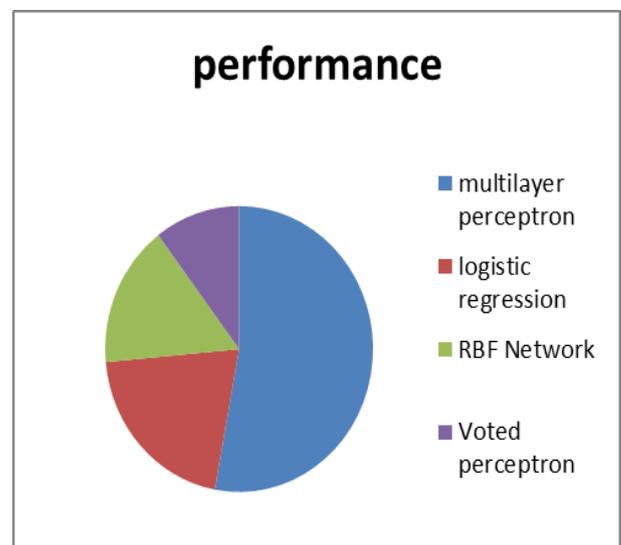


Fig.9: Performance of neural network algorithms

Fig.9 clear shows that performance of 4 major neural network algorithms among this, multilayer perceptron has highest performance than the logistic regression, RBF network, voted perceptron. The accuracy of each tested

algorithm is graphically exposed so that it makes easy to understand accuracy of each classifier on a conducted dataset and It is clearly shown that the MLP (multilayer perceptron) algorithm give higher detection accuracy among all other algorithm. Fig.8 shows the individually tested NN algorithms as accuracy classified data and inaccuracy classified data. Therefore, the various NN Algorithms to find accuracy of the resulting predictive model and to visualize erroneous predictive. The major advantages are Highly Accuracy, Noiseless, Independence, and easy to maintain. NN useful especially when there is no prior knowledge about the analysed data. They are more commonly used to complex relationship between input and output or to find pattern in data.

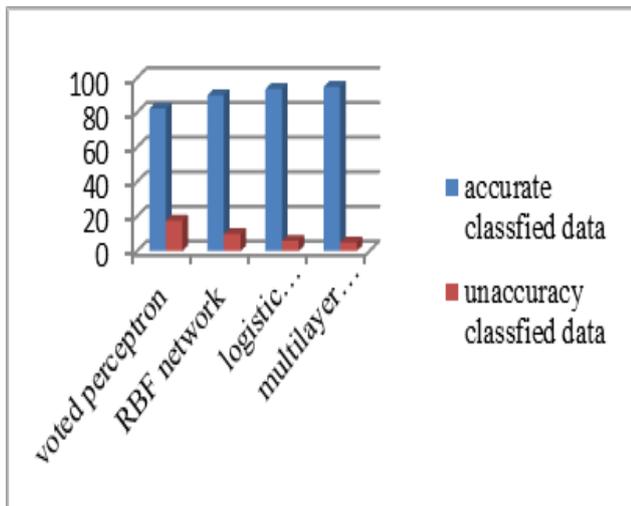


Fig.10: Classification Results

## 8. Conclusion

This paper analysis the various NN Algorithms of neural network techniques in data mining is perform parallel tested using a proposed working methodology and finally concludes that among the major neural network algorithms Multilayer perceptron are more efficient and perform effective result by self adjusting nature and produce highest accuracy result and less error measure.

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