ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 3, Issue 1, January 2015

A Role of Neural Network Construction through the Weka Tool Using Iris Dataset

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ABSTRACT: Neural Network(NN) are often referred to as Artificial Neural Network(ANN) to distinguish them from biological neural networks , which are modeled after the workings of the human brain.TheNeural Network are similar to that of the decision tree, requires that a graphical structure be applied to the data. This paper implements Artificial Neural Networks (ANNs) in WEKA through Multilayer Perceptron (MLP) function. MLP is a classifier that uses backpropagation method to classify instances.This system implements the neural network through the iris dataset for various functions and its efficiency are compared.

KEYWORDS: Artificial neural network ,multilayer perceptron, Weka tool

I. INTRODUCTION

The Neural Networks can be viewed as a directed graph with source(input),sink(output) and internal (hidden) nodes. The Neural Network is actually an information processing system as well as various algorithms that can access that graph. As with the human brain ,the NN consists of many connected processing elements. The Neural network is structured as a directed graph with many nodes and arcs between them. The nodes in the graph are like individual neurons,while the arcs are their interconnections.the Neural Network model is a computational model consisting of three parts:

1. Neural network graph that defines the data structure of the neural network.
2. Learning algorithm that it indicates how learning takes place.
3.Recall technique that determine how information is obtained from the network.

Activation Function:

An activation function is a processing element function or a squashing function.This function is applied to the set of inputs that are coming into the inputs arcs. An activation function can also be stated as firing rule, some of the activation functions are

- **Linear:** A Linear activation function produces a linear output value based on the input.
  $f_i(s)=cS$

- **Threshold or step:**The output value is either a 1 or 0,depending on the sum of the product of the input values.

$f_i(S)=\{1$ if $S>T$
0 otherwise$\}$

- **Sigmoid:**This is an "s" shaped curve with output values between -1 and 1 and is monotonically increasing.

$f_i(S)=1/(1+e^{-cs)}$

- **Hyperbolic tangent:**

A variation of the sigmoid function is the hyperbolic function
$f_i(S)=(1-e^{-s})/(1+e^{-cs})$

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- **Gaussian:**

Gaussian function is a bell shaped curve with output values in the range[0,1]

$f_i(S)=e^{-s2/v}$

II. RELATED WORK

The paper [1] describes the WEKA software which is suitable for a variety of real-world problems.Paper[2] proposes various machine learning techniques to agricultural data bases.Paper[3] proposes advanced machine learning using weka tool.Paper[4] proposes a tool box for extended Multi-Instance data with perceptron and multi_instance learners[3]. We have designed and implementing throughWEKA, which permits rapid experimentation on a given dataset using a variety of machine learning schemes and has several facilities for interactive investigation of the data: preprocessing attributes, evaluating and comparing the results of different schemes, and designing comparative experiments between different methods and datasets. paper[4] proposes a categorization that has been provided based on the different soft computing tools and their hybridizations used, the data mining function implemented, and the preference criterion selected by the model.

In this paper Section 3 describes about dataset.Section 4 describes the implementation details of various algorithms and functions we have selected are discussed . Section 5 describes the results and discussions Section 6 concludes our paper[5].

III. DATASET

For experiment analysis the data set iris is selected from UCI data repository.This data sets consists of 3 different types of irises they are namely Setosa, Versicolour, and VirginicaThe rows being the samples and the columns being: Sepal Length, Sepal Width, Petal Length and Petal Width.

IV.IMPLEMENTATION DETAILS

This IRIS datasets are implemented through Weka tool and the following functions such as MultilayerPerceptron, Logistics, Simple Logistics, SMO are implemented[6].

MultilayerPerceptron: A multilayer perceptron is a feed forward artificial neural network model that are used to map sets of input data onto a set of appropriate output.
Logistics: Class for building and using a multinomial logistic regression model with a ridge estimator.

Simple Logistics: This is a simple logistics regression model with a ridge estimator[7].

SMO(Sequential Mining Optimization): This implementation globally replaces all missing values and transforms nominal attributes into binary ones[8].

V. RESULTS AND DISCUSSION

The concept of neural network is used through the weka tool or weka software using IRIS data set.The IRIS data sets which we have collected from UCI data repository consists of 150 instances.
The results are shown in the following table table 1

ISSN(Online): 2320-9801
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Algorithm	Time taken (Secs)	Correctly classified instance	Incorrectly classified instance	% of accuracy
Logistics	0.03	144	6	96.0
Multilayer perceptron	0.2	146	4	97.33
Simple.logistics	0.15	141	9	94.0
SMO	0.19	144	6	96.0

Table 1 : Comparative results of various algorithms

From the above table we can understand that multilayer perceptron have higher % of accuracy ie 97.33% and the time taken is less if we select the logistics function.

The following figure Fig1 clearly shows the time taken for different classifiers.Logistics function takes less time when compared with other algorithms.

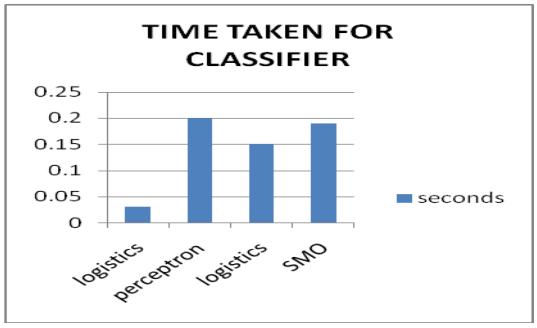

Fig.1:Time taken for classifiers

The following Fig 2 shows the percentage of correctly classified instances[10].

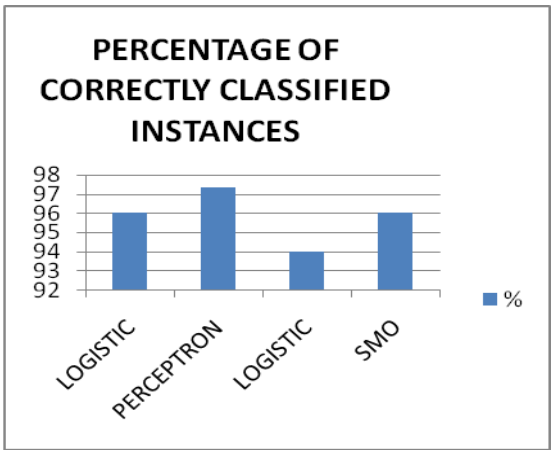

Fig.2:Percentage of correctly classified instances

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VI. CONCLUSIONS

In this paper the concept of neural network is implemented through Weka tool for various functions and the time taken and the percentage of correctly classified instance are verified for IRIS dataset.This paper concludes that Multiple perceptron takes higher accuracy than other algorithms.In future this algorithm can be extended by applying various activation functions.

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