Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2014, 6(12):582-584

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Temperature prediction using two-layer feed-forward backpropagation

Anjaneyulu G. S. G. N.[*1], Lavanya V.[2], Mohana Priya V.[2] and Angelin Sheeba M.[2]

[1]*SAS, VIT University, Vellore, India*
[2]*Department of Computer Application, SITE, VIT University, Vellore, India*

ABSTRACT

Weather forecasting has become one of the challenging areas for researchers. Our day to day jobs, from agriculture to business depends on the day's weather. Accurate weather prediction is much needed for our society today. This paper predicts daily mean temperature using two-layer feed-forward neural network and the accuracy of the predicted values is checked.

Keywords: Two-layer feed-forward Neural Network, prediction.

INTRODUCTION

The frequent weather changes has made weather forecasting really important. The day to day increase in the temperature and also the heavy rains at times, draws the attention of the people towards accurate weather forecasting. In this paper, relative atmospheric humidity, wind speed, sea level pressure and rainfall are taken as the input parameters to predict temperature. The meteorological data is collected from the "Royal Netherlands Meteorological Institute (KNMI)" for Valkenburg station for a period of 2010-2013.

2. RELATED WORK:

Y.Radhika and M.Shashi, 2009[1] in their paper, have predicted the atmospheric temperature. They had compared the performances of SVM (Support vector machine) and Multi Layer Perceptron (MLP). Non-linear regression was used to train the SVM and Back propagation was used to train the MLP. Their work concluded that SVM has better accuracy.

Dr. S. Santhosh Baboo and I.Kadar Shereef, 2010 [2] used BPN (back propagation neural network) to predict the temperature. It was found that though neural network supported many training algorithms, BPN has highly accurate prediction than the other algorithms.

Shaminder Singh, Pankaj Bhambri and Jasmeen Gill, 2011 [3] have used neural networks with genetic algorithm to predict temperature. They had integrated back propagation and genetic algorithm to train the network and followed time-series prediction. They compared the output of back propagation and back propagation with genetic algorithm and concluded that back propagation with genetic algorithm is more efficient.

Parag.P.Kadu, Prof.Kishor P.Wagh and Dr.Prashant N.Chatur, 2012 [4] used ANN (Artificial Neural Network) to predict air-temperature. In formulating the ANN model, they had constructed a three-layer network for their prediction.

3. DATA COLLECTION:

The meteorological data is collected from the "Royal Netherlands Meteorological Institute (KNMI)" for the region Valkenburg for a period of 2010-2013. The parameters used to predict the temperature are wind speed, relative atmospheric humidity, sea-level pressure and rainfall. The daily mean of each parameter is taken. The daily mean temperature is taken as the target data. Sample set of data is provided below:

DATE	WIND SPEED 0.1m/s	SEA-LEVEL PRESSURE 0.1 hpa	RELATIVE ATMOSPHERIC HUMIDITY %	RAINFALL 0.1 mm
01/01/2010	39	10031	78	12
02/01/2010	40	10136	90	4
03/01/2010	26	10221	86	63
04/01/2010	30	10153	94	0
05/01/2010	40	10047	86	11

Table.1 Sample input data

DATE	TEMPERATURE 0.1 degree C
01/01/2010	-16
02/01/2010	4
03/01/2010	-33
04/01/2010	-7
05/01/2010	14

Table.2 Sample target data

4. PROPOSED ALGORITHM:

TWO-LAYER FEEDFORWARD NEURAL NETWORK:

A feed forward neural network can also be said as biologically inspired classification algorithm. It consists of large number of simple neuron like units. Every layer is connected to all of its previous layers. The connections need not be necessarily equal. The data we give enters as input to the network, travels through all the layers of the network and reaches the output layer.

5. ANALYSIS-UPSHOTS:

The input parameters required to predict the temperature are wind speed, relative atmospheric humidity, sea-level pressure and rainfall. The prediction is done using Matlab R2013a. The input data and the target datasets are imported to Matlab. A network is then created and the datasets are trained using Levenberg-Marquardt back propagation. The mean standard error is obtained. The datasets are trained for different sets of neurons. These outputs are compared. The data is applied to different number of neurons and the outputs obtained are tabulated and shown below.

DATE	TARGET	5 NEURONS	10 NEURONS	15 NEURONS	20 NEURONS
01/01/2010	-16	-16.00128302	-14.99989719	-9.99997822	-6.99967743
02/01/2010	4	3.999652463	2.999913373	6.999695661	7.999787931
03/01/2010	-33	-33.00122976	-30.00002262	-29.99944087	-27.9982591
04/01/2010	-7	-7.000919719	-5.000117356	-4.999678783	-6.000407134
05/01/2010	14	14.00013673	12.00010725	9.00030623	11.0006879
06/01/2010	-18	-18.00133691	-11.99985346	-10.00026703	-12.99903533

Table. 3 The output of different neurons

CONCLUSION

Neural network is found to be the best prediction algorithm. The predicted values differ with different neurons. The value of the neurons is adjusted to see at which neuron the value is more accurate. Finally, it is found that the value is more accurate for 5 neurons.

REFERENCES

[1] Y.Radhika; M.Shashi, *International Journal of Computer Theory and Engineering*, Vol.1, No.1.PP.55-58,**2009**

[2] Parag.P.Kadu; Kishor P.Wagh; Prashant N. Chatur," *International Journal of Computer Science & Communication Networks*, Vol 2(1), 61-64. **2012**.
[3] S. Santhosh Baboo; I.Kadar Shereef,"*International Journal of Environmental Science and Development*, Vol. 1, No. 4. PP. 321-326,**2010**.
[4] Shaminder Singh; Pankaj Bhambri; Jasmeen Gill, *International Journal of Computer Science* Issues, Vol. 8, Issue 5, No 3.PP. 28-32,**2011**
[5] Debnath, et.al *Applied Physics Research*, Vol. 1, No.2. PP. 37-44, **2009**
[6] Mohsen Hayati; Zahra Mohebi, *International Journal of Electrical, Robotics, Electronics and Communications Engineering*,Vol.(1) No.4 PP. 654-658, , WASET, **2007**.
[7] Arvind Sharma; Manish Manoria," A Weather Forecasting System using concept of Soft Computing", pp.353-356, http://ieeexplore.ieee.org/number=4289915 (**2006**).