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Stock Market Prediction Using Artificial Neural Networks

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***Abstract*— In applied science and connected fields, artificial neural networks areprocess models galvanized by animals' central nervous systems (in specific the brain) that are capable of machine learning and pattern recognition. They'retypicallyconferred as systems of interconnected "neurons" that maycipher values from inputs by feeding data through the network.**

Data mining (the analysis step of the "Knowledge Discovery and knowledge Mining" method, or KDD),ANknowledge base subfield of engineering science,is that themachinemethod of discovering patterns in giantknowledge sets involving strategies at the intersection of computing, machine learning, statistics, and information systems.The general goal of the {information} mining method is to extract information from an information set and remodel it into a clear structure for additional use. Except for the raw analysis step, it involves information and knowledge management aspects, knowledge pre-processing, model and reasoningissues, power metrics, qualityissues, post-processing of discovered structures, visualization, and on-linechange.

The aim of this project is implementation of neural networks with back propagation algorithm for stock market. Borrowing from biology, researchers are exploring neural networks - a new, non-algorithmic approach to information processing. A neural network is a powerful data-modeling tool that is able to capture and represent complex input/output relationships. The motivation for the development of neural network technology stemmed from the desire to develop an artificial system that could perform "intelligent" tasks similar to those performed by the human brain.

Artificial NeuralNetworks are being counted as the wave of the future in computing. They are indeed self-learning mechanisms which don't require the traditional skills of a programmer. Back propagationis one of the approaches to implement concept of neural networks. Back propagation is a form of supervised learning for multi-layer nets. Error data at the output layer is back propagated to earlier ones, allowing incoming weights to these layers to be updated. It is most often used as training algorithm in current neural network applications. In this paper, we apply data mining technology to stock market in order to research the trend of price; it aims to predict the future trend of the stock market and the fluctuation of price. This paper points out the shortage that exists in current traditional statistical analysis in the stock, then makes use of BP neural network algorithm to predict the stock market by establishing a three-tier structure of the neural network, namely input layer, hidden layer and output layer. Finally, we get a better predictive model to improve forecast accuracy.

Keywords- ***Artificial Neural Network, Back propagation, Data mining.***

1. INTRODUCTION

In recent years, monetary markets became additional reticular. The elemental factors have become additional essential for the analysis of monetary market. The analysis in recent past shows that the nonlinear domain with computing technologies may be sculptured additional exactly compared to single market and linear applied math strategies that are the mainstay for technical analysis for past decade.

Prediction of stock price level movement is thought to be a difficult task of monetary statistic prediction. Associate degree correct prediction of stock worth movement might yield profits for investors. As a result of the quality of exchange information, development of Economical models for predicting is incredibly troublesome. Statistical strategies and neural networks are usually used for statistic prediction. Since stock markets are complicated, nonlinear, dynamic and chaotic.

Neural networks among varied computing tools are more and more accustomed the monetary prognostication as neural nets are found to be technologically versatile and powerful, ideally suited to perform monetary market research. Many studies have shown that artificial neural networks have the capability to be told the underlying mechanics of stock markets. In fact, artificial neural networks are wide used for prognostication monetary markets.

Artificial neural network is a mathematical model. It has capability to machine learning and pattern matching. Neuron is basic unit of nervous system such as brain. ANN is borrowed from central nervous system. It is inspired by biological technology. Biological neuron stores knowledge in memory bank, while in an artificial neuron the data or information is distributed through the network and stored in the form of weighted interconnection.

Figure 1 show graphical representation of artificial neuron. Where x_i represents the input to the neuron and w_i represents the weight of the neuron.

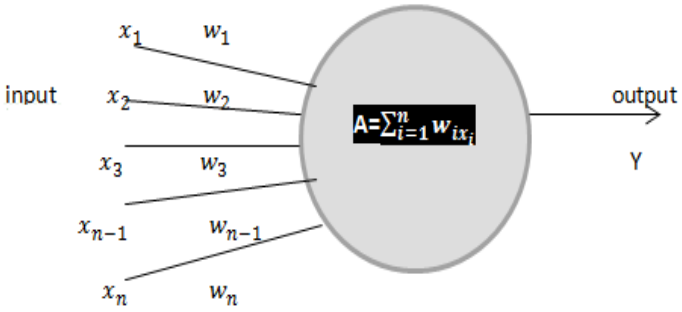

Figure 1: Graphical representation of artificial neurons

2. LITERATURE REVIEW

A share market could be a place of high interest to the investors because it presents them with a chance to learn financially by finance their resources on shares and derivatives of varied firms. it's a chaos system; that means the activity traits of share costs area unit unpredictable and

unsure. to create some style of sense of this chaotic behavior, researchers were forced to search out a way which may estimate the result of this uncertainty to the flow of share costs. From the analyses of varied applied math models, Artificial Neural Networks area unit analogous to non-parametric, nonlinear, regression models. So, Artificial Neural Networks (ANN) actually has the potential to tell apart unknown and hidden patterns in information which may be terribly effective for share market prediction. If successful, will this will this could this may} be useful for investors and finances which can completely contribute to the economy. There are unit totally different strategies that are applied so as to predict Share Market returns.

The securities market reflects the fluctuation of the economy, and receives 10 million investors' attention since its initial development. The securities market is characterized by bad, high-yield, thus investors are involved concerning the analysis of the securities market and making an attempt to forecast the trend of the securities market. However, securities market is wedged by the politics, economy and plenty of different factors, let alone the quality of its internal law, like value (stock index) changes within the non-linear, and shares knowledge with high noise characteristics, so the normal mathematical applied mathematics techniques to forecast the securities market has not yielded satisfactory results. Neural networks will approximate any advanced non-linear relations and has hardiness and fault-tolerant options. Therefore, it's terribly appropriate for the analysis of stock knowledge. In dozens of neural network models that were suggests, researchers usually use the hop garden network. hop garden network is that the commonest feedback network model, it's one among the models that almost typically studied currently. The hop garden network is that the mono layer recognized by an equivalent vegetative cell, and is additionally a symmetrically connected associative network while not learning operates.

3. PROPOSED SOLUTION

BP network is that the back-propagation network. It's a multi-layer forward network, learning by minimum mean sq. error. It may be employed in the sphere of language integration, identification and adaptation management, etc. BP network is semi supervised learning. Initial of all, artificial neural network has to learn an exact learning criteria, so it will work. Tips for e-learning (Electronic Learning) may be listed as below. If the result yielded by network is wrong, then the network ought to scale back the chance of creating identical mistake next time through learning. This project uses data processing technique to check historical information concerning share market in order that it will predict the desired values a lot of accurately.

Algorithm:-

1. Accept input sample
2. Perform its weighted summation.
3. Apply it to input layer neurons.
4. Process all inputs at each neuron by transfer function to get individual.
5. Hidden layer and repeat 1,2,3,4 stepspass it as an input to all neurons of for hidden layer neurons.
6. Pass output of hidden layer neurons to all output layers and repeat 1,2,3,4 steps to get final output.
7. Display the final output.

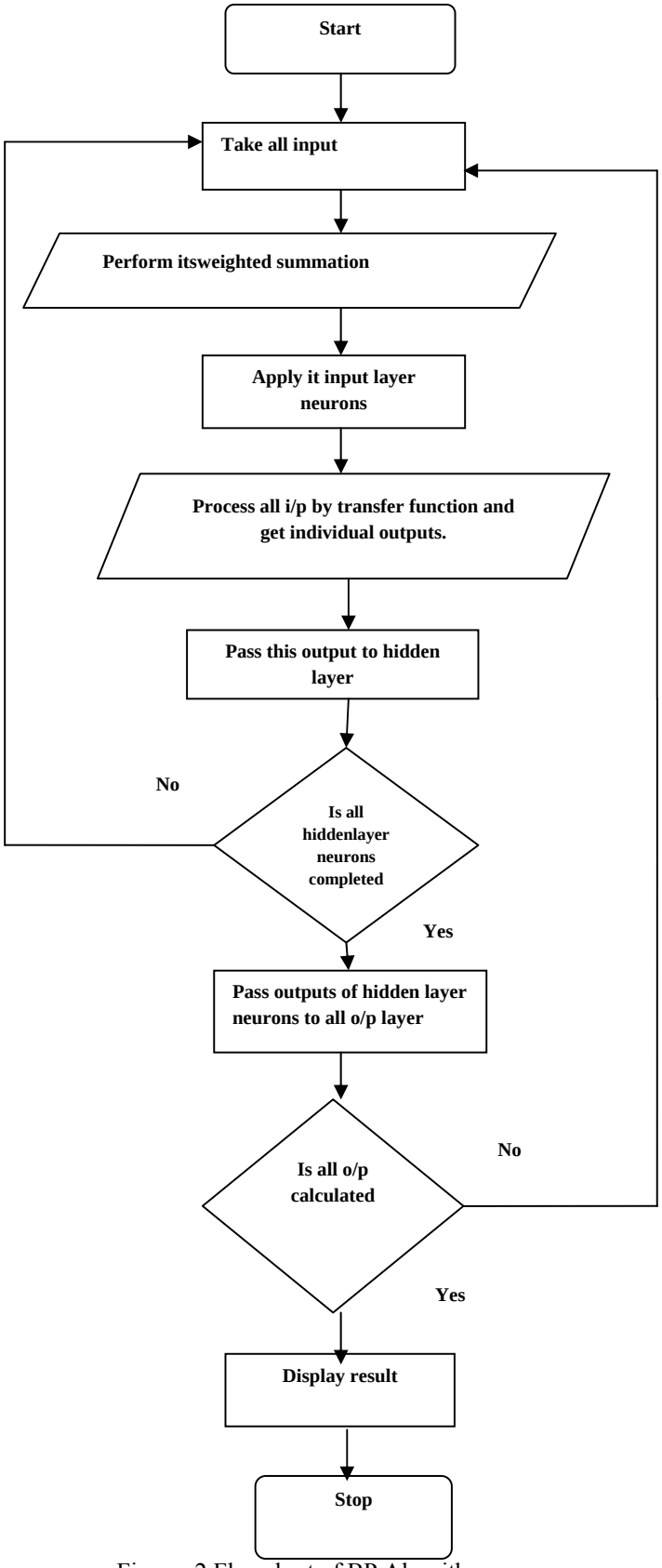

Figure: 2 Flowchart of BP Algorithm

4. MATHEMATICAL MODEL

Error calculation:
Calculating Root Mean Square,
Let RMS is denoted as Root Mean Square,
E is denoted as Error of difference between actual value and predicted value
GE means Global Error.

$E=\sqrt{GE}/size$

Updating, error value,
GE+=Δ*Δ
Where,delta=expected value-actual value
Activation function:
Sigmoid

Result=1/$(1+e^{-d})$

Tan hyperbolic:

Result=e^{d} *2.0-1.0/e^{d} 2.0+1.0

5. RESULT

Testing was performed on different companies and results obtained were quite satisfactory. We are showing the Table of actual and predicted price of companies. From the table prediction accuracy is good.

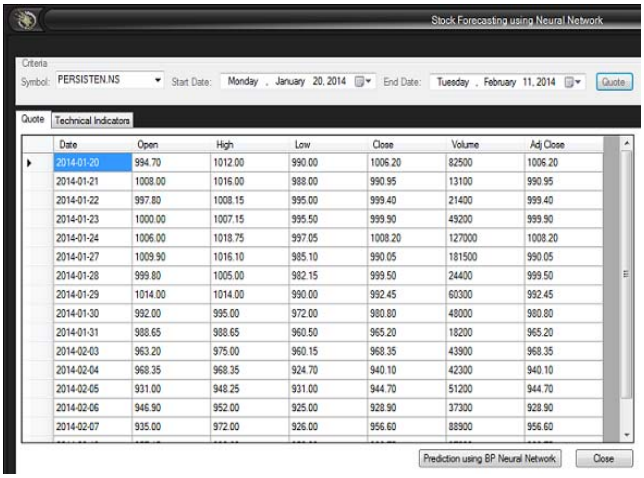

Figure 3: Showing the past stock price

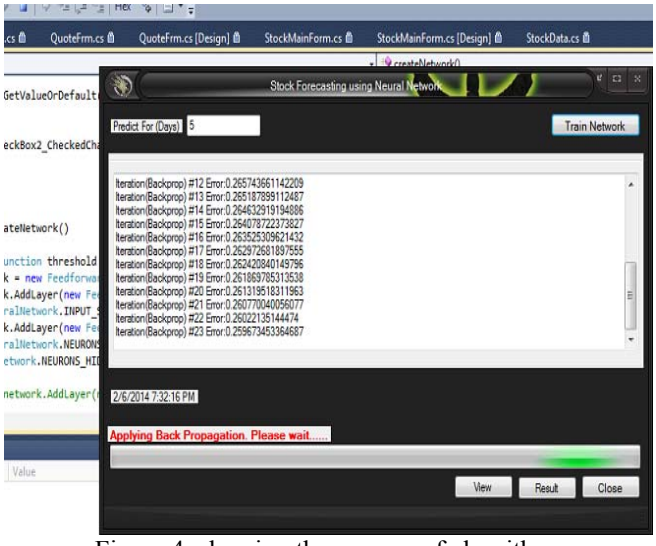

Figure 4: showing the process of algorithm

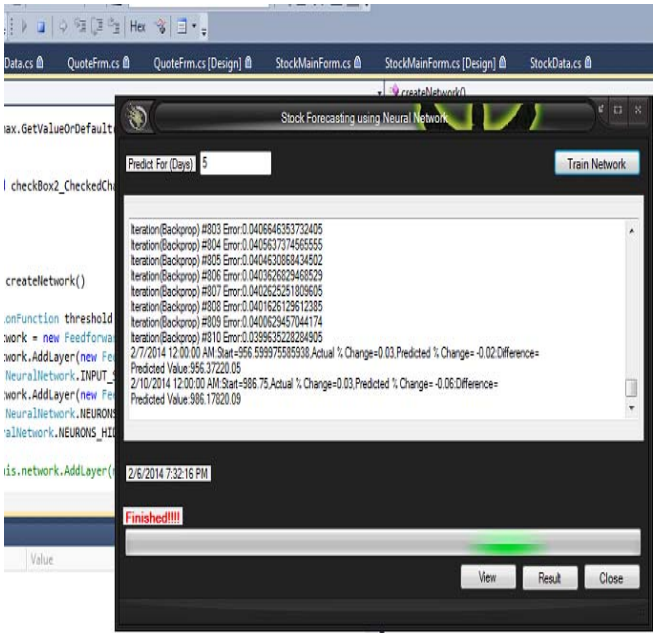

Figure 5: showing the actual price and predicted price

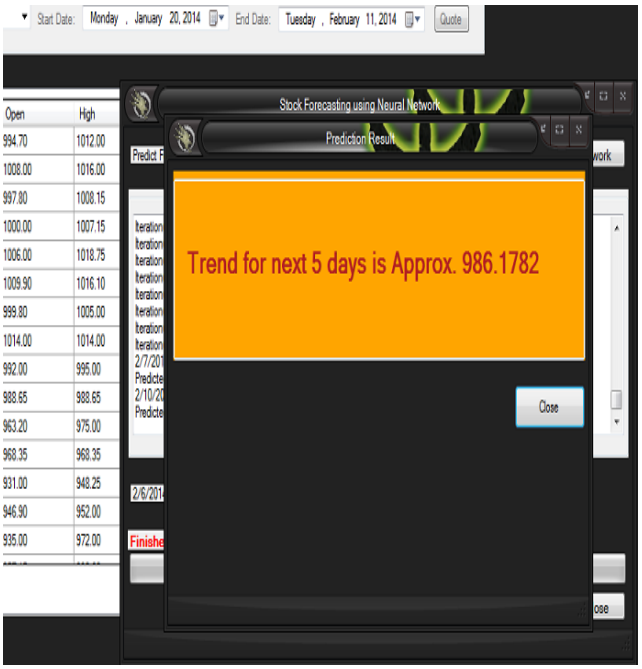

Figure 6: showing the Actual prediction result of next 5 days

CONCLUSION

In this paper, we tried to sum up the application of Artificial Neural Networks (ANN) for predicting stockmarket. ANN have shown to be an effective, general purpose approach for pattern recognition, classification, clustering and especially time series prediction with a great degree of accuracy. Nevertheless, their performance is not always satisfactory. Back propagation algorithm is the best algorithm to be used in Feed forward neural network because it reduces an error between the actual output and desired output in a gradient descent manner.

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