www.ijemr.net ISSN (ONLINE): 2250-0758, ISSN (PRINT): 2394-6962

Volume-7, Issue-2, March-April 2017

International Journal of Engineering and Management Research

Page Number: 490-493

Stock Prediction using Neural Networks

Sushma Devi Patel[1], Daisy Quadros[2], Vidyullata Patil[3], Manasi Pawale[4], Prof. Harsha Saxena[5]
[1,2,3,4]Computer Engineering, Ramrao Adik Institute of Technology, INDIA
[5]Computer Engineering, Ramrao Adik Institute of Technology, INDIA

ABSTRACT

Stock price prediction is one of the most challenging tasks. Stock markets are considered to be a promising trading field as it gives easy profits with low risk rate of return. Stock market with its huge and dynamic information sources is considered as a suitable environment for researchers. In this paper we have used Back Propagation Feed-forward neural network, historical data of various companies like TCS, Infosys, SBI listed on Bombay Stock Exchange and situational factors for stock prediction which would help investors in making appropriate decision. According to the results, the Back Propagation Feed Forward algorithm is robust giving results close to actual stock prices with minimum error rate.

Keywords-- Stock market prediction, neural networks

I. INTRODUCTION

Due to highly volatile nature of stock market the awareness of the risk amongst investors has increased gradually. Simultaneously, people investing in stock market also hope to gain a great profit from their investments. But, in the competitive market it is difficult to perform better As a result, using a system which would predict better stock prices would help the investors and financial experts in making proper decisions and earn profits. Also, machine learning and artificial intelligence algorithms have made advances in tackling complex mathematical models for stock price prediction.

Stock market prediction is an attempt made to predict the future prices of a company stock traded on an exchange. By generalizing the problem, we are talking about time series forecasting. This is the construction of a model which can predict future values, based on previously observed values. One of the commonly used tools for this type of prediction is ANNs (artificial neural networks).

Our system will be analysing stock prices based on company's historical stock data and situational factors. The stock values of the company are affected by the following factors:-

1. *Demand and Supply:* Demand and Supply of shares of a company is a major reason price change in stocks.
2. *Corporate results:* This will be regarding to the profits earned by the company over a period of time.
3. *Popularity:* Main Strength is in hands of share buyer. Popularity of a company affects buyers. Like good news related to a company may result in increase in the number of buyers and bad news may lead to decrease in number of buyers.

The stock value depends on other factors as well, but we are taking into consideration only these main factors.

Artificial neural networks are generally presented as systems of interconnected "neurons" which can predict the output values from inputs, and are capable of machine learning as well as pattern recognition due to their adaptive nature."In ANN layers are interconnected and information flows in only one direction from input layer to output layer passing through intermediate hidden layers. Weights and biases are adjustable parameters of neural network and they help in improving results.

There are many other machine learning techniques which can approximate functions, but when it comes to a large and non-linearly changing volatile data, then neural network can be a best option

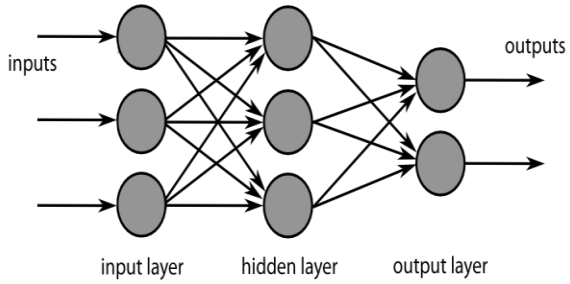

Fig 1: Structure of Neural Network

Types of neural networks:-

- Back Propagation Feed Forward Neural Network- The network is feed-forward in that none of the weights cycles back to an input unit or to an output unit of a previous layer.
- Recurrent neural networks – Recurrent neural

network perform same task on every element or input and previous computations influence the outputs.

- Radial basis function neural networks- An RBFN measures input similarities and perform classification based on it.

II. LITERATURE SURVEY

A. Technical Parameters

Various technical parameters considered are opening price, high price, low price, closing price, WAP, Number of shares, number of trades, total turnover, deliverable quantity, percent deliverable quantity to traded quantity, spread high-low, spread close-open.

B. Situational factors

The study reveals that situational factors and the stock prices are co-integrated and hence, both are equally important. According to research it has been observed that the stock prices are directly related to the money supply and industrial production but inversely related to inflation. Stock prices are largely dependent on situational factors like disaster, economy, world events, terrorism, scandals, and news related to companies. The exchange rate and the short-term interest rate are not crucial factors while affecting stock prices. There is bidirectional causality exists between industrial production and stock prices whereas, unidirectional causality from money supply, inflation and interest rates to stock price. Whereas natural disasters occurrences showed sudden drop in stock prices while, sports events showed positive impact on stock prices.

III. PROPOSED SYSTEM

The field of neural networks can be thought of as being related to artificial intelligence, machine learning, parallel processing, statistics, and other fields. The problems that are the most difficult to solve by traditional computational methods could be more easily tackled using neural network.

Using this system user can predict future stock prices. For the prediction there is need of company database. Main purpose of this system implementation is prediction. For this first of all given database as a input to the prediction system and input data must be valid. Neural Network would give as output the graphical representation of predicted values and actual values as well as stock prices.

Neural Network Toolbox™ provides algorithms, functions, and apps to create, train, visualize, and simulate neural networks. You can perform classification, regression, clustering, dimensionality reduction, time-series forecasting, and dynamic system modelling and control.

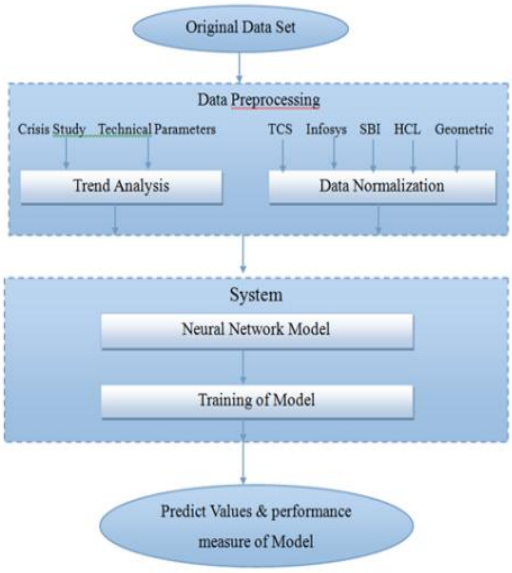

Figure 2: System flow diagram

A. Methodology

The ANN type we have used is the back propagation network. The network is trained by supervised learning that iteratively adjusts weights which are randomly selected by neural network. The learning process has two steps:

– Forward pass: passing input data through the network until it reaches the output layer.

Back propagation pass: the values from the output layer are compared with the target values and an error is computed for each output unit. The errors are reduced by adjusting the weights. The error estimates of the output units are then used to derive error estimates for the units in the hidden layers. Here also, the weights are adjusted to reduce the errors. Finally, the errors are propagated back to the connections stemming from the input units.

The error in each layer is multiplied by a term called learning rate, which directs network in the learning process. Learning rate is directly proportional to learning speed and inversely proportional to accuracy.

After each iteration of forward backward pass system learns incrementally from input output layer and reduces the difference between predicted outputs and targets. After extensive training, the network will eventually establish the input-output relationships through the adjusted weights on the network.

To predict the future stock market prices we have used historical data. So in this system, we required stock market (share market) data which can take from BSE India Ltd. for various companies like TCS, Infosys, SBI, Geometric, and HCL. For this demo we have used the data of past 5 years from 2011 to 2016 for training and stock prices of next day are predicted.

The process starts with data normalization which is done in order to convert the data into form understandable to ANN. ANN needs the input layer to receive values in the range of 0 (zero) and 1 (one). For this, in this step we will also normalize the input data to have values between 0 and 1. This is done by using min-

max normalization technique by applying the following formula:

Normalized value = (Value – Min) / (Max – Min) * (1-0)

The next step is to train the neural network using the normalized data. For the training step the whole data is divided into three subsets:-set of training data, set of validation data and the set of testing data. Training of the network is done using 70% of data, validation is done using 15% of data and rest 15% of the data is used for testing.

B. Performance of the model

Performance of the model is evaluated by different performance measures like Root Mean Square Error (RMSE), Mean Absolute Percentage Error.

1. Root Mean Square Error:-

The root-mean-square error (RMSE) or root-mean-square deviation (RMSD) provides measure of the differences between values predicted by a model or and the values actually observed. Basically, the RMSE represents the sample standard deviation of the differences between expected and resultant values.

$$RMSE = \sqrt{\frac{\sum_{t=1}^{n}(A_t - F_t)^2}{n}}$$

Where At is the actual value and Ft is the Predicted value at time t.

2. Mean Absolute Percentage Error[4]:-

The mean absolute percentage error (MAPE), provides measure of accuracy of a method for modelling fitted time series values in statistics, especially in trend estimation. It usually denotes percentage accuracy, and is defined by the formula:

$$MAPE = \frac{1}{n}\sum_{t=1}^{n}\left|\frac{A_t - F_t}{A_t}\right|$$

Where At is the actual value and Ft is the predicted value at time t.

C. Accuracy

In the field of statistics, the accuracy of a measurement system is the degree of closeness of quantity's measured value to its actual (true) value.

$\%\ Error = (Ft - At)/At * 100$;

$Accuracy = 1 - \%\ Error$

Where At is the actual value and Ft is the predicted value at time t.

IV. RESULTS

Feed-forward network:-

Below is the figure of feed-forward neural network with excel sheet having 245 input rows as input to neural network, 1 hidden layer with 10 neurons and one output layer.

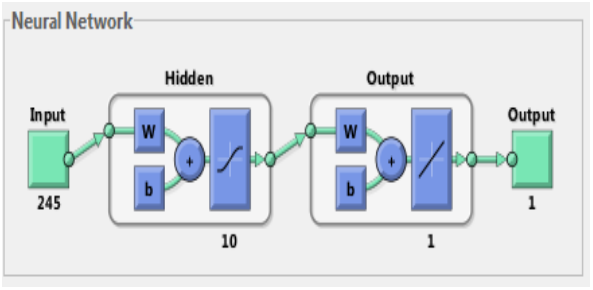

Fig. 3: Feed-forward Neural Network

Yearly graph:-Graph showing the output of system using data with varying number of years is shown. This graph shows that network gives good results with minimum errors by training it with 1-4 years of data

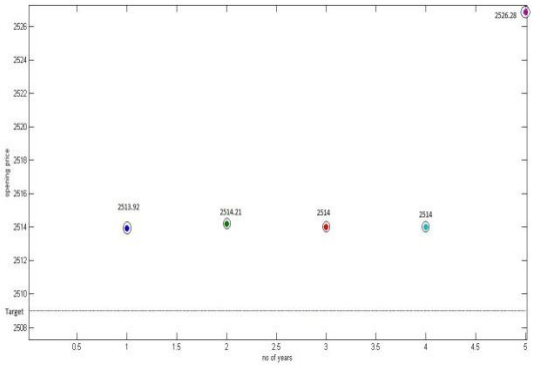

Fig. 4: Graph of target versus Predicted opening price

Predicted opening and closing price :-

The opening price and closing price of the next day is predicted using feed-forward neural network.

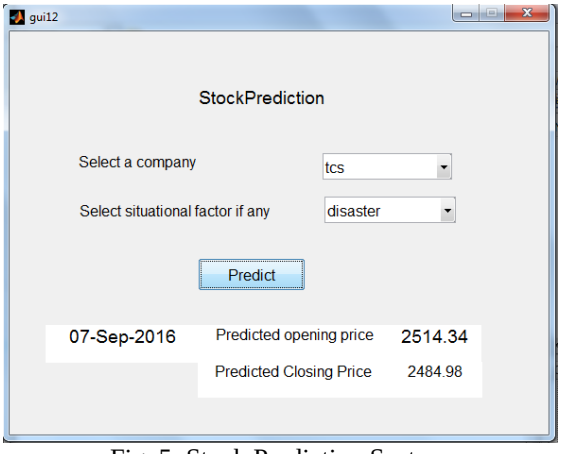

Fig. 5: Stock Prediction System

Performance graph:-

A graph depicting the performance of the network during training, validating and testing phase is shown

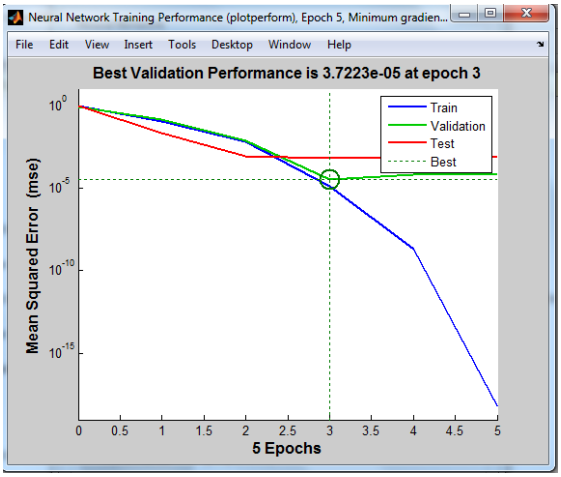

Fig. 6: Performance Graph

V. CONCLUSION & FUTURE SCOPE

Gaining profits from investing in stock market is difficult task. The future price forecasting based on the historical data could be considered as a method mainly falling into the technical analysis domain, where the evaluation of the securities is derived from the statistics generated by market activities. The Back-propagation feed-forward neural network algorithm can be used to approximate the future stock values and trends relating the historical data with future performance and combining the fundamental analysis into the forecasting by using additional information such as local and global economic conditions and events, earning reports, etc. The further continuation of this research work includes experimenting different neural network architectures and topologies to optimize the forecasting performance

REFERENCES

[1]The Impact of Macroeconomic Fundamentals on Stock Prices Revisited: Evidence from Indian Data Pramod Kumar NAIK *, Puja PADHI **

[2] http://technobium.com/stock-market-prediction-using-neuroph-neural-networks/

[3] http://economictimes.indiatimes.com/

[4] Pooja Singh "Indian Stock Market and Macroeconomic Factors in Current Scenario", International Journal of Research in Business Management (IMPACT: IJRBM) Vol. 2, Issue 11, Nov 2014, 43-5

[5]Anand Bansal, "Foreign Institutional Investor's Impact on Stock Prices in India", Journal of Academic Research in Economics.

[6] Samveg Patel, "The effect of Macroeconomic Determinants on the Performance of the Indian Stock Market"

[7] Dr. T. Muthukumaran&Dr.V.K.Somasundaram, "An Analytical Study Of Interest Rate And Stock Returns In India", Acme Intellects International Journal of Research in Management, Social Sciences & Technology ISSN 2320 – 2939 (Print) 2320-2793 (Online) Research Vol- 8 No. 8 Oct 2014

[8] Jatinder Loomba," Do FIIS Impact Volatility Of Indian Stock Market?" International Journal of Marketing, Financial Services & Management Research, Vol.1 Issue 7, July 2012, ISSN 2277 3622

[9] J. N. Mukhhopadhyaya,"An Analytical Study of Indian Stock Market Volatility and Its Linkage with Oil and Gold Prices", International Journal of Business Management, Economics and Information Technology Vol. 3, No. 1, January-June 2011: 91-109