

Indian stock market prediction using neural network technique

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Abstract

Stock market is complex and untidy place for investment. Appropriate stock selection those are beneficial for earning profit is very difficult task. In this paper, we are using neural network technology to predict future trend of stock price of the stock exchanges like BSE,NSE etc .As the prices are fluctuating regularly ,it has become necessary to predict the stock prices accurately. This paper is pointing out shortages that exist in current traditional and statistical analysis used for predicting price trend. Here we are making use of Back-propagation Neural Network which is three tier architecture namely input layer, hidden layer and output layer. Hidden Layer includes two technical indicators namely Sequential Moving Average and Exponential Moving Average to get close forecast price to improve accuracy.

Keywords- Artificial Neural Network, Backpropagation Feedforward Algorithm, Sequential Moving Average, Exponential Moving Average

I. INTRODUCTION

Stock market is a place where the stock prices are fluctuating daily. It is a chaotic system and place of High interest for investors to benefit them financially. Stock market is affected by political ,economical factors. Stock Market is characterized by high risk, high yield. Considering the characteristics and factors which affect stock market which have non-linear prices traditional mathematical and technical analysis has not yielded satisfactory result. So modern technique like BP neural network can be used to compute complex non-linear relation in historical data to forecast future trend.

II. DATA COLLECTION AND PRETREATMENT

In this paper, we study analytical stock data from Yahoo Financial Interface. It provide us table of data in .csv format as shown in fig 2.1.

1	Date	Open	High	Low	Close	Volume
2	25/01/2010	546.59	549.88	525.61	529.94	4021800
3	19/01/2010	581.2	590.42	534.86	550.01	5168800
4	11/01/2010	604.46	604.46	573.9	580	5647400
5	04/01/2010	626.95	629.51	589.11	602.02	4015600
6	28/12/2009	621.66	625.99	618.01	619.98	1452000
7	21/12/2009	597.61	619.52	595.67	618.48	1845800
8	14/12/2009	595.35	600.37	590.99	596.42	2634700
9	07/12/2009	584.21	594.75	581	590.51	1665900
10	30/11/2009	580.63	594.83	577.11	585.01	1930100
11	23/11/2009	576.49	587.06	570.97	579.76	1749600
12	16/11/2009	575	578.78	569.4	569.96	1967900

Figure 2.1 Stock data provided by Yahoo Financial Interface

III. TECHNICAL INDICATORS

Moving Average:

In this we are taking sum of stock prices of certain days and calculate an average .Then we connect them into line to observe price trends. Here we use two types of Moving Averages first is Sequential Moving Average and other one is Exponential Moving Average.

A. Sequential Moving Average:

In this we are calculating average stock prices in sequential manner. For example, if we have stock prices of 50 days then we calculate average of stock prices of days 1-10, 11-20, 21-30, 31-40, 41-50 days, and use these averages to plot a graph. We can then analyze this graph to observe changing stock prices.

B. Exponential Moving Average:

In this we are calculating average stock prices using following equation.

$$\text{Days} = 2^n \text{ where } n = 1, \dots, m.$$

$$\text{Average} = \frac{\text{Sum of stock prices of certain days}}{\text{No. of days}}$$

For example if we have stock prices of 64 days. Then firstly we calculate average prices of 2 days, then 4 days, 8 days, 16 days and so on.

IV. LITERATURE SURVEY

- Existing system :

In last two decades forecasting the stock prices has become an important field of research .Where they used to use macro economic variables and stock market index returns to compute future trend .But the return was non-linear which is hard to compromise with an existing system.

- Proposed system :

Paper aim at creating data analysis tool that will make long term and short term predictions of future values using neural network. Historical data is feeded to the neural network and network get trained with historical data and mathematical formulae's (indicators).

V. SYSTEM ARCHITECTURE

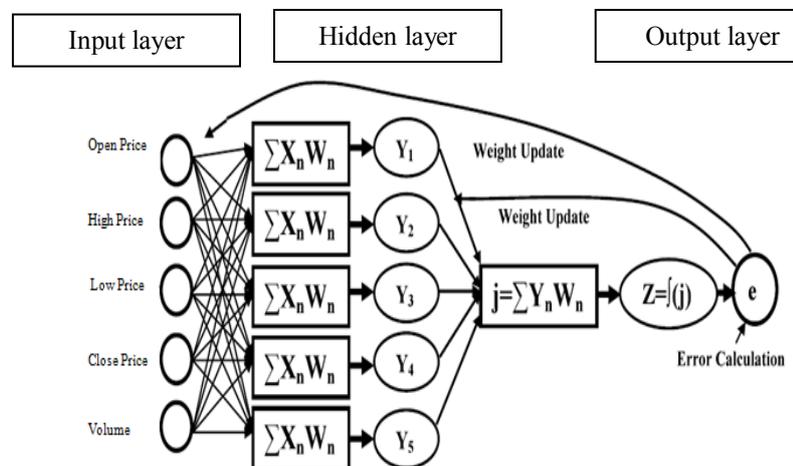


Figure 5.1 Architecture of artificial neural network

Neural network being the heart of this paper. All the computation required for prediction is performed by neural network. This is best suitable approach because we don't have to understand input and output in great detail as compared to traditional technique .There are three layers in this architecture namely input layer , hidden layer and output layer . Input includes opening price ,high price, low price, closing price and volume .In hidden layer we are using two indicators namely sequential moving average (SMA),exponential moving average (EMA).Artificial neural network requires some learning criteria before performing prediction ,hence we need to give training to the neurons. For this training purpose , we have used back propagation learning algorithm.

VI. BACKPROPAGATION FEEDFORWARD ALGORITHM

Backpropagation is an abbreviation of “Backward propagation of errors”. This algorithm works in two phases, namely error propagation and weight update. In this algorithm we first calculate the changes for weights of the output neurons, then calculate the changes backward starting from the second last layer and propagate backward the local error terms that is means square error. The output layer calculate the in the same way as the hidden layer neuron and generate the final output which is compared with the real output and calculate an error signal “e”.

$$e = \frac{\text{actual output} - \text{ANN output}}{\text{actual output}}$$

The error „e” is generated from the Propagation Phase is used to update the weight using the following formula:

$$\text{Updated Weight} = \text{weight(ol d)} + \text{learning rate} * \text{output error} * \text{output(neurons i)}$$

$$* \text{output(neurons i+1)} * (1 - \text{Output (neurons i+1)})$$

VII. ANALYSIS AND EVALUATION

For the simulation we used the past historical data of ACI pharmaceutical company which include only 5 inputs, we tried to predict stock values for future 8 days of November. Following figure shows the prediction and real values of the ACI pharmaceutical Company. The input past historical data is from 1-9-2010 to 31-10-2010. The average error of this simulation was 1.60 %.

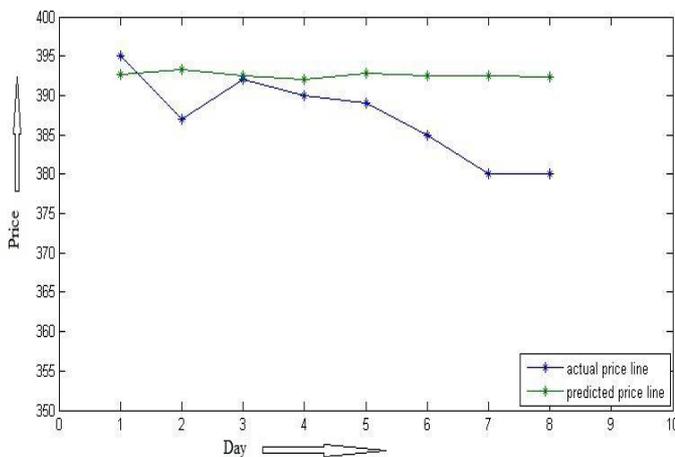


Figure 7.1 Graphical evaluation of stock price

VIII. CONCLUSION

It has been already proved through research that forecasting stock prices using traditional technique is very tedious, expensive and time consuming. So by using neural network technique we can easily predict stock prices which are closer to actual prices. if we train our network with more data input then it generate more error free predicted price.

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