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FORECASTING OF STOCK MARKET PRICE WITH ANN AND ITS INDICATORS

Nitesh Rajput[1], Anurag Kumar Jain[2]
[1]Student RITS Bhopal, [2]HOD CS&E RITS Bhopal

Abstract: Today stock market prediction is an emerging field that in future the stock price will be increased or decreased. Therefore we can predict the stock market variations such that which companies share value in next time will go high or low. The proposed method can determine unseen pattern from the historic data that have likely predictive ability in their investment decisions. The forecast of stock markets is a demanding task of financial time series prediction. Many researchers provided various method of time series forecasting but the neural network is better solution from others. Because it is depends on learn by example. For this forecasting a huge amount of historical data is used better prediction. There are four indicators (Relative Strength Index (RSI), Rate of Change (ROC), Simple Moving Average (SMA), Linear Regression Indicator (LRI)) were combined in this methods for better performance with the neural network back propagation algorithm. When MLP is trained sufficient data and parameters with optimal Architecture .it can forecast better stock price very well. This model helps to predict next day open price of SBI stock price with less error and good accuracy. The performance is considered by minimum mean square error such as MAE, M.S.E, and RMSE. it compares the result with other model. To predict stock market data we are using ANN with back-propagation.
Keyword: ANN (Artificial Neural Network), Back Propagation (BP), Stock Indicators.

I. INTRODUCTION

A Share Market can be a place of high interest to the investors because it presents them with a chance to learn financially by finance their recourse on shares and derivatives of different firms. It is a chaos system that means the activity traits of share cots area unit unpredictable and unsure. To create some style of sense of this chaotic behavior, researchers were enforced to search out way which may estimate the result of this uncertainty to the flow of share costs. From the analysis of dissimilar useful math model, Artificial Neural Network is a small analogous to non- parametric, nonlinear and regression model. So Artificial Neural Network has the potential power to get apart unknown and unseen patterns in information which may be valuable for stock market prediction. If successful, this might be useful for investors and finance which can completely cooperate to the economy. There are a variety of different strategies that are applied so as to predict share market returns.

The output of hidden layer is than send to the output layer but it will also be modified by some weight between hidden and output. The output of hidden layer is processed by output layer and produce actual output by processing activation function. Neural network works on two learning techniques. It may be supervised and unsupervised .In the supervised learning target (teacher) is presented in learning. But in unsupervised learning target output are not present. In the neural network information is passed from neurons to other neurons.

STOCK INDEX INDICATORS

Financial instruments called indicators are popularly used by trader for predicting the trends of stock prices. TheIndicator is calculated from the historical data sets. The examples of stock index indicators are Moving Average (MA), linear regression Indicators (LRI), and etc. In this paper, we provide the formulation of five indicators such as Relative Strength Index (RSI), Rate of Change (ROC), Simple Moving Average (SMA).Linear regression Indicators (LRI), These indicators are described as follows.

Relative Strength Index (RSI):RSI is developed by J. Welles Wilder. RSI is a momentum oscillator that measures the speed and the change of price movements [6]. RSI shows overbought and oversold signals which helps trader make a trading decision. RSI is calculated by the formula as follows.

$$RSI = 100 - 100/(1\text{-}RS)$$

WhereRS is the average gain over the average loss, the average gain is the summation of gains over the previous periods, and the average loss is the summation of loss over the previous periods [6]. RSI oscillates between 0 and 100. Traders consider two threshold lines. The overbought signal is generated when the RSI value is greater than 70 and oversold signal is generated when the RSI value is less than 30.

Rate of Change (ROC): ROC is a pure momentum oscillator that measures the percentage of change in the price. The ROC calculation compares the current price with the price n periods ago [6]. ROC is defined as follows.

$$ROC = [(C - CNP)/CNP] * 100$$

Where C is the closing price today and CNP is closing price n periods ago. ROC value is greater than zero indicates that the buying pressure is increased. ROC value is less than zero indicates that the selling pressure is increased. Traders

Observe the ROC with the actual price. For the simple example, if the ROC trends to decrease below the zero line and the actual price trends to increase, the selling signal is generated. In the other hand, if the ROC trends to increase above the zero line and the actual price trends to decrease, the buying signal is generated.

Moving Average (MA): MA is developed by Gerald Appel in the late seventies [6]. MA is used to forecast the

overbought (or the oversold) trading. MA fluctuates above and below the zero line as the moving averages [6]. MA is calculated by using the following formula.

$$MA = N_1 - N_2$$

Where N1 is the exponential moving average of N1 periods and N2 is the exponential moving average of N2 periods. N1 must be shorter than N2.

Linear Regression Indicators (LRI): The Linear Regression indicator is calculated by fitting a linear regression line over the values for the given period, and then determining the current value for that line. A linear regression line is a straight line that is as close to all of the given values as possible.

Linear Regression Line = a + bx

Where:

a = (Σy – bΣx) / n

b = (nΣ(xy) – (Σx) (Σy)) / (nΣx² – (Σx)²)

b = Linear Regression Slope.

x = the current time period.

y = the data series (Usually the close price).

n = Number of periods.

Proposed Method: In this dissertation proposed a model for forecasting the stock market price. The process of forecasting and improved the performance rate depend on neural network as well as also depend on feed-forward back propagation method.

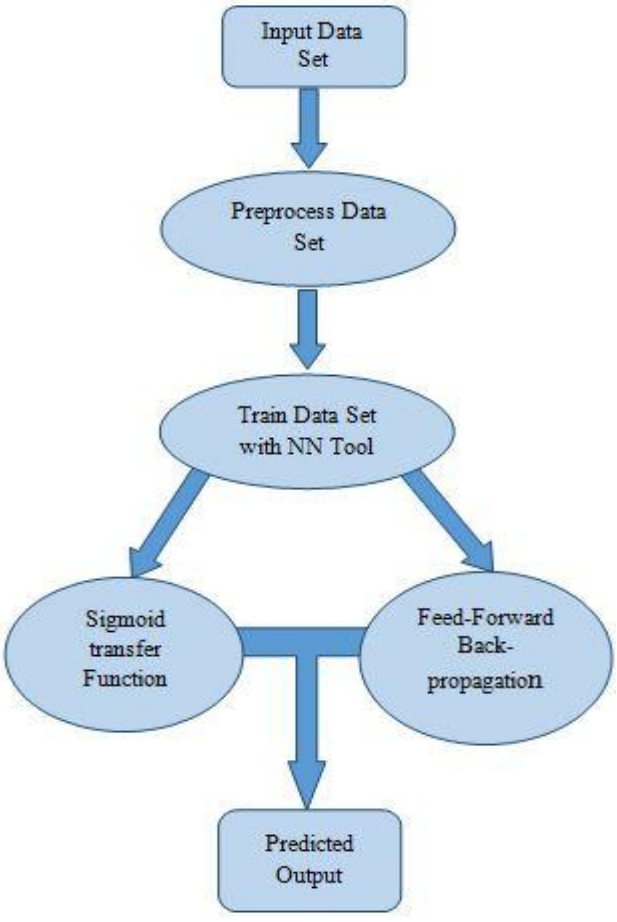

Figure1: Proposed Model

Training of Network:-After creation of data set now we start nntool for trained a network with input set and target set.

Step1: Open nntool

Step2: Import the input set ,target set , sample set.

Step3: Create a network

Step4: After create a network select the training function (Levenberg-Morquardt)

Step5: select the learning function (Gradient descent with momentum) and training function (LOGSIG).

Step6: Train network with epoch and validation check.

Epoch is a measure of the number of times all of the training vectors are used once to update weight.

IMPLEMENTATION AND EVALUATION

The experiments and results for the proposed method and optimize result are declare. Matlab r2013a version used for implementation.The MATLAB language is a high-level matrix/array language with control flow statements, functions, data structures, input/output, and object-oriented programming features. It allows both "programming in the small" to rapidly create quick programs you do not intend to reuse. You can also do "programming in the large" to create complex application programs intended for reuse.

Explanation of Dataset:

We are using neural network for forecasting the price of stock.

For neural network we create some dataset such as:

- Input Dataset
- Target Dataset
- Sample Dataset
- Desire Input

The full data set, which contains stock histories for an entire year, is available in both historical data format and in a daily update format. Weekly, Monthly, and Quarterly update data sets are also available in both formats. Visitors can conserve bandwidth by downloading updates on a regular basis rather than downloading the full data set repeatedly.

Date	15-MA	15-LRI	14-RSI	14-ROC
24-01-2012	9.81933333333333	9.83333333333334	58.3333333333333	0.817160367722166
25-01-2012	9.82400000000000	9.83925000000000	57.0532915360502	0.509683995922517
26-01-2012	9.83133333333333	9.86058333333334	62.3864836325238	0.710659898477160
27-01-2012	9.83933333333333	9.89658333333334	66.1580062851714	1.83861082737489
30-01-2012	9.85000000000000	9.91675000000000	63.4187350656544	1.22075279755849
31-01-2012	9.85733333333334	9.93583333333334	62.0356507525472	1.53217568947906
01-02-2012	9.87000000000000	9.95650000000000	65.2959393735406	1.62932790224033
02-02-2012	9.88533333333333	9.99333333333334	70.1302486170331	2.23804679552391
03-02-2012	9.90066666666667	10.0281666666667	70.7569539442321	2.44399185336049
06-02-2012	9.91666666666667	10.0559166666667	70.7569539442321	2.54841997961264
07-02-2012	9.94000000000000	10.1005000000000	76.4801189388966	3.14720812182742
08-02-2012	9.96133333333333	10.1440833333333	76.9656032333002	3.88151174668029

Fig1: Experimental Data Set

II. PERFORMANCE MEASURES RESULT THROUGH PROPOSED METHODOLOGY

After completion of training of network we select the sample data set for predicted output with mean square error.

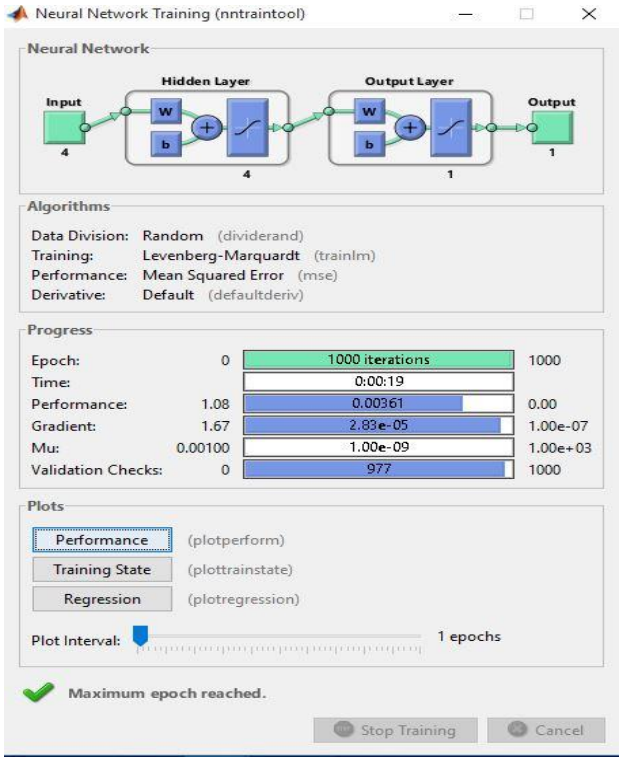

Fig2: neural network training phase

Best validation performance measure at epoch no 23 which is 0.0043085

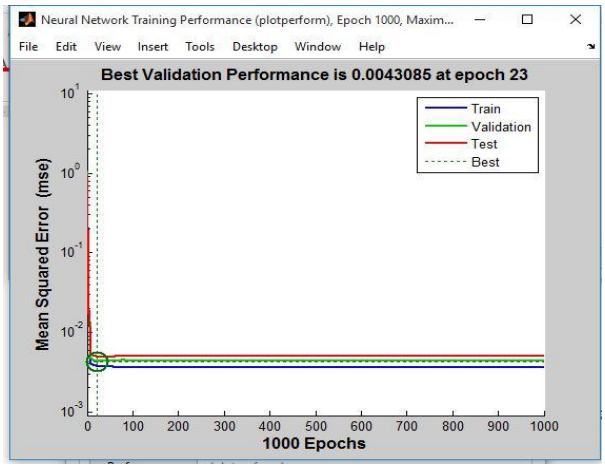

Fig3: Validation performance

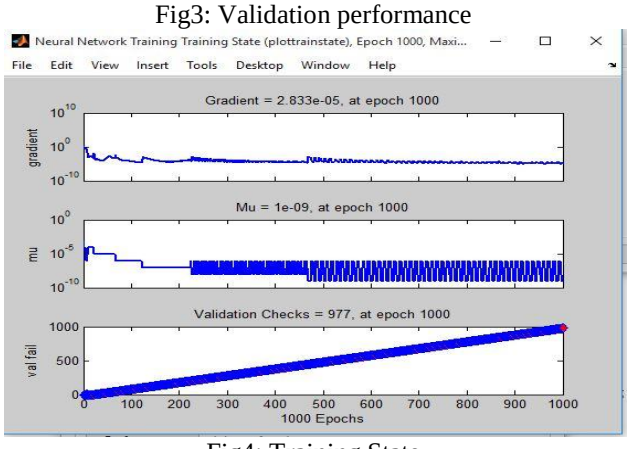

Fig4: Training State

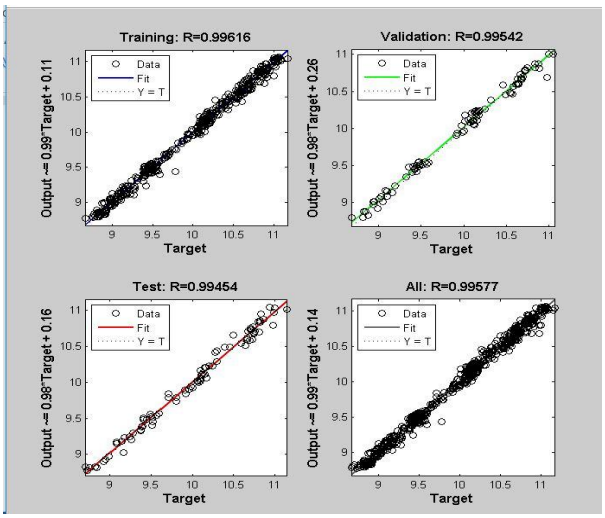

Fig5: Training Report base on test and validation

Date	Actual	Predicted	Error
25/01/2012	9.89	9.8774	0.012646
26/01/2012	9.87	9.8693	0.00072029
27/01/2012	9.96	9.9029	0.057054
30/01/2012	9.98	9.9428	0.037212
31/01/2012	9.92	9.9346	-0.014608
01/02/2012	9.98	9.9447	0.035257
02/02/2012	10	9.9679	0.032117
03/02/2012	10.06	10.0031	0.056864
06/02/2012	10.06	10.0255	0.034542
07/02/2012	10.04	10.0467	-0.0066609
08/02/2012	10.16	10.1062	0.053846
09/02/2012	10.12	10.1617	-0.041705
10/02/2012	10.12	10.0997	0.020317

Fig6: Predicting price, Actual price and Error using ANN

Average of MSE = 0.0089

Our experiment result more better than base paper result which is 0.2 (average MSE)

Fig7: Predicting price, Actual price graph

III. CONCLUSION

In this research paper we completed several attempts before we got the architecture that was suitable for this network. We tried several combinations of layers, momentum, learning rate, epochs and so on. Due to the nature of time series forecast, we need past data to predict future. From Our predictions, in proposed model it is realized we might need more data to train the network to be able to give a better prediction. Also time series data of stock can be erratic at times and give a sudden increase or decrease in price. So at time of predictions could be further from the actual prices experienced in the market. The output result of analysis shows that neural network is a powerful method for predicting stock time series data. As researchers and investors struggle to outperform the market, the use of neural networks to forecast stock market prices will be a continuing area of research. So in our proposed model there are 583data points are used for training purpose. Our model may give far better result if distributed data will be used during training

Future work: The proposed algorithm is a combination of feed-forward back-propagation and transfer function for ANN. The modified algorithm had improved the performance of prediction, in terms of MSE (mean square error) but unable to achieve the prediction ratio 100%. Our model may give far better result if distributed data will be used during training. Our Model gives less percentage of error with better prediction. We are still working on this model for get 100% prediction result outcome.

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