



Financial Forecasting using Neural Network

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Abstract— People have a lot of investments so they can make money, maybe even enough money to better their situation for both themselves and their family. Good investments can equal thousands of dollars, but bad investments can mean financial ruin. The paper presents a proposed system which will be able to predict the future trend of the stock market and the fluctuation of price. After a comparative study it was found that BP neural network algorithm for prediction is better than other data mining approaches. The BP (Back Propagation) neural network algorithm uses three tier structure of neural network algorithm [1]. As BP neural network is supervised learning algorithm, so the system takes online input data sets from the date selected by the user to the current date. In order to achieve the predicted value different stock market technical indicators are used such as moving average, KD indicators, MACD, Relative Strength, and Index RSI. The output of the system is displayed in two forms graphically and statistically.

Keywords—Moving average (MA), Random indicator (KDJ), Moving Average Convergence/Divergence (MACD), Relative Strength Index (RSI), On Balance Volume (OBV), BIAS, Simple Moving Average (SMA), Exponential Moving Average (EMA), Back Propagation (BP).

I. INTRODUCTION

In the proposed system, we can apply neural network technique 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 system 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. After building the data pre-processing set before data mining, lots of widely used stock market technical indicators such as the KD indicators, similarities and differences between exponential smoothing moving average MACD, Relative Strength Index RSI, will be introduced into the model. Finally, we get a better predictive model to improve forecast accuracy.

The stock market reflects the fluctuation of the market economy, and receives ten million investors' attention since its initial development. The stock market is characterized by high-risk, high-yield, so investors are concerned about the analysis of the stock market and trying to forecast the trend of the stock market. However, stock market is impacted by the politics, economy and many other factors, coupled with the complexity of its internal law, such as price (stock index) changes in the non-linear, and shares data with high noise characteristics, therefore the traditional mathematical statistical techniques to forecast the stock market has not yielded satisfactory results. Neural networks can approximate any complex non-linear relations and has robustness and fault-tolerant features. Therefore, it is very suitable for the analysis of stock data.

II. SOFTWARE DESIGN

The Project aims at creating a data analysis tool that will make long term or short term predictions of future values using mathematical formulae and historical patterns in a time series. The automated computer programs using data mining and predictive technologies do a fare amount of trades in the markets. Data mining is well founded on the theory that the historic data holds the essential memory for predicting the future direction. This technology is designed to help investors discover hidden patterns from the historic data that have probable predictive capability in their investment decisions. The prediction of stock markets is regarded as a challenging task of financial time series prediction.

There are three main modules of the system

1. To Add new stock: After login –in to the system the customer can add any stock in the database other than the existing stock. This added stock will be visible in the list and the message will be displayed.
2. To Delete an existing stock: The system gives provision to delete an all ready existing stock from the database.
3. BP Algorithm:
 - This module allows selecting an existing stock whose prediction is to be made and also the date from when the online data is to be fetched.
 - The fetched data is displayed in the grid with the details.
 - Now the system uses Back-Propagation (BP) neural network algorithm and the technical indicators like moving average, MACD, Relative Strength Index RSI, KDJ indicator to forecast the value.

- The output can be seen in two different ways- graphical and statistical.

A. Assumptions and Dependencies

This system is dependent on the features and services provided by Net Beans. It is also assumed that the working environment supports all the algorithms which will be used to implement this system.

1. User should select the stock(company) and then click on get quotes.
2. Performance of the algorithm will depends upon the data set provided.
3. Output in graphical format is dependent on the open, close price value.

III. IMPLEMENTATION DETAILS

Data analysis is one way of predicting if future stocks prices will increase or decrease. Three methods of analyzing stocks were combined to predict if the day’s closing price would increase or decrease. This project delivers various techniques which are able to predict with future closing stock price will increase or decrease better than level of significance. Also, it investigated various global events and their issues predicting on stock markets. It supports numerically and graphically.

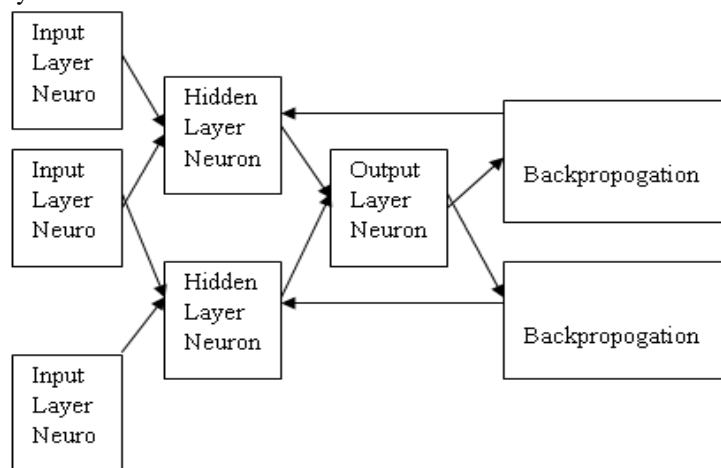


Figure:1 Block diagram of the proposed system

In the proposed system we are designing a share market forecasting model based upon historical data by applying y 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. After building the data pre-processing set before data mining, lots of widely used stock market technical indicators such as the KD indicators, similarities and differences between exponential smoothing moving average MACD, Relative Strength Index RSI, will be introduced into the model.

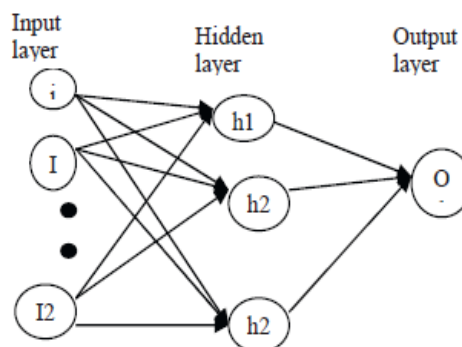


Figure.2 BP neural network

A. Algorithm used

BP neural network algorithm is a supervised learning algorithm, its main idea is: Enter the study samples, and then we can use the back-propagation algorithm to adjust the weights and bias of network by repeated training. Ensure the output vector is close to the expected vector as far as possible. When the sum of squares of network output layer is less than a specified sum of squares, we can complete the training and save the weights and bias of the network.

The following are the steps of the algorithm

Step1 : Initialize the connection weight and threshold at random. Calculate the hidden layer and output layer output unit of the network from a given pair if input-output entered.

$$b_j = (f \sum_{i=1}^n w_{ij} a_i - \theta_j) \quad c_i = (f \sum_{j=1}^p v_{ji} b_j - r_i)$$

In this formula : the actual output of the hidden layer is calculated

$$d_i^k = (y_i^k - c_i) c_i (1 - c_i) \quad e_j^k = [\sum_{i=1}^q d_i v_{ji}] b_j (1 - b_j)$$

Step 2: Compute the new connection weights and new thresholds, formulas are as follows:

$$v_{ji}(n+1) = v_{ji}(n) + \alpha d_i^k b_j$$

$$w_{ij}(n+1) = w_{ij}(n) + \beta e_j^k \alpha_i^k \quad r_i(n+1) = r_i(n) + \alpha d_i^k$$

$$\theta_j(n+1) = \theta_j(n) + \beta e_j^k$$

In the formula: α , β are learning coefficients ($0 < \alpha < 1, 0 < \beta < 1$).

Step 3: Select the next pair of input patterns and then train the network repeatedly according to Step2 until output error reaches the training requirements.

The following are the technical indicators used in the system :

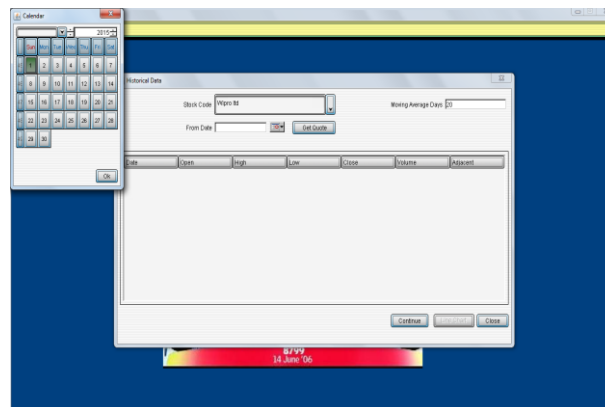
- Moving average (MA)
- Random indicator (KDJ)
- Moving Average Convergence/Divergence (MACD)
- Relative Strength Index (RSI)
- OnBalanceVolume (OBV)
- BIAS
- Increase scope

The system accepts the values of the above mention technical indicator and can give the output in the form different graphical form.

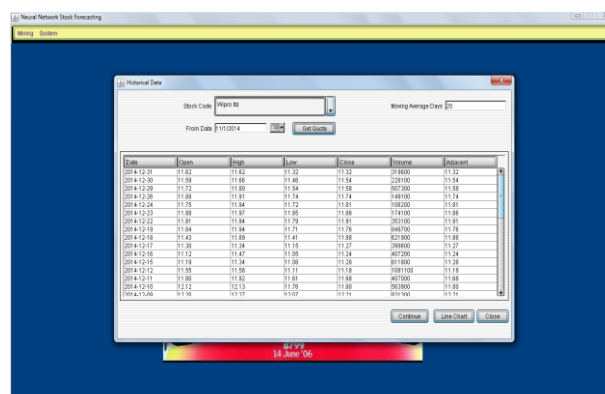
IV. RESULT

Data Set: For the proposed system the data set would be the values selected by the user of the technical indicator mentioned above.

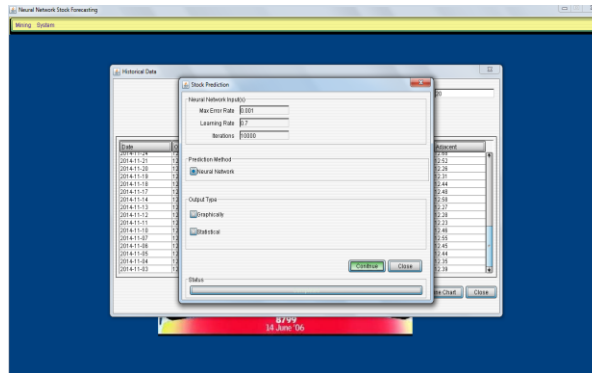
Result set: The result is represented in the form of graph which represents the output in graphical (Line chart,scattered crat) and statistical.



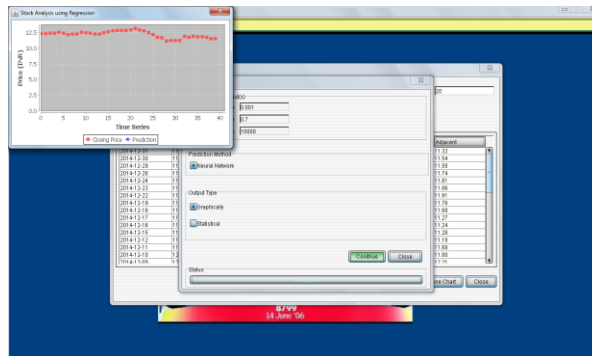
Snapshot1: Provision for selecting back date and company name.



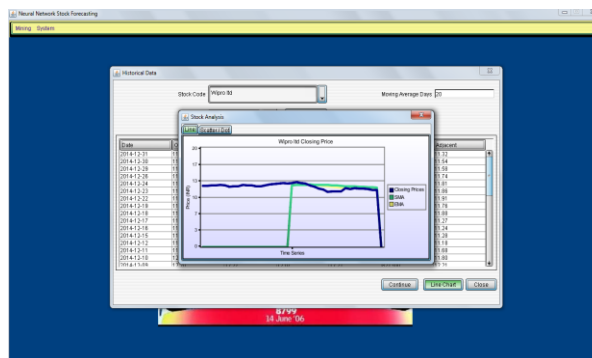
Snapshot 2: Complete online data fetched is displayed in the grid.



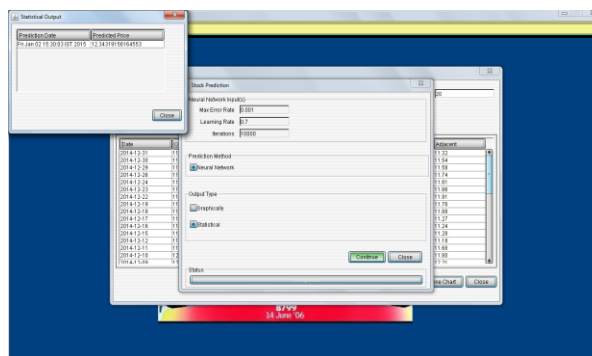
Snapshot 3: Selecting the type of data output



Snapshot 4: Output in Line Chart



Snapshot 5: Output in scattered chart



Snapshot 6: Statistical output

The graphical data will help the user as it gives a fair idea of forecasting in the stock before making an investment.

V. CONCLUSIONS

The result is represented in the form of graph which would help the investors to make comparisons between predicted and actual stock value. It is observed that the proposed system gives better prediction using BP neural network model as the relative and absolute error are less than 1%. Further study and exploration is possible to improve forecast result by optimising the model such as to find a more suitable network, selecting the better relevant input and output parameters for training the network

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