Forecasting Stock Price Trend Using Data Mining Techniques

M. Tawarish, K.Satyanarayana

Abstract*: Nowadays, Most of them want to forecast stock prices precisely, but woeful, that is A very difficult part. To note that one cannot forecast stock prices; it is that the edge of error in the forecasts is disagreeably extensive and that the best approach to forecast stock prices is simple to the point that it is accessible without exertion to everybody. The forecast of stock price is regarded as a challenging task of fiscal time series predict. There are five techniques to examine stocks were secured to predict the closing price. The techniques used are Typical Price (TP), Bollinger Bands, Relative Strength Index (RSI) and Moving Average (MA). Data Mining helps these techniques to give better results. This research paper will discuss to forecast the closing stock price will raise or reduce by scientifically.

Index Terms*: Bollinger Bands, Data mining, Forecast, Moving Average, Relative Strength Index, Typical Price.

I. INTRODUCTION

Stock price forecast is a part of financial system forecast. It is the forecast of prospect of stock market's future improvement, in light of precise analysis of factual information and stock market data, beginning with stock market history, business as usual and consistency, and applying scientific techniques [1].

Currently the most frequently used forecast method is developed through some linear methods. Although researchers have done much work in the application of neural networks in stock price forecast, the present research is mainly focused on the construction and optimizing of techniques of data mining and the settlement of technical aspects, but not the discussion on the solution of problems in this kind.

By investigating the literature stock market forecast techniques can be grouped into four types. 1) Typical price, 2), Bollinger Brands 3) Relative Strength Index and 4) Moving Average methods.

Typical Price [2] is also called as pivot point for average arithmetic for high, low, and closing prices for the specific period. $T_P = (h + l + c)/3$

Bollinger bands Technique [3], the idea of Bollinger Bands is to provide a virtual meaning of high and low prices of a market. By description, prices are high at the upper band and low at the lower band. This definition can assist in exact pattern recognition and is useful in comparing price actions of indicators to arrive at regular trading decisions. Bollinger Bands is an arithmetical chart characterizing the prices and unpredictability more time of a financial instrument or product, using a fixed method by John Bollinger in the 1980s.Bollinger Bands use the forecast stock method of calculating standard deviation, the proper divisor for the sigma calculation is n, not n − 1.

Relative Strength Index [4], the relative strength index was done by J. Welles Wilder and in print a 1978 book, new terms in Technical Trading Systems, and in Commodities magazine in the June 1978 topic. It has become one of the most famous oscillator indexes. The relative strength index (RSI) is a scientific indicator used in the study of financial markets.

It is intended to chart the current and past strength or weakness of a stock or market based on the closing prices of a recent trading period. The pointer should not be confused with relative strength. The RSI provide signals that inform investors the approximate time to forecast the stocks.

Moving Average[5], The moving average (MA) is an easy technological analysis means that smooth out price data by creating an always updated average price. The standard is taken over an exact period of time, like Ten days, Twenty minutes, Thirty weeks or any time period the dealer choose. There are merits to using a moving average in your trading, as well as choices on what type of moving average to use. Moving average strategies are too familiar and can be adapted to any time edge, suit both long-standing investors and short-range traders.

II. DATA MINING

Data mining as an enabling tools for trade intellect. Knowing the objectives and benefits of business analytics and data mining. Identifying the wide range of applications of data mining. Learning the regular data mining processes CRISP-DM, SEMMA, KDD [6].

The Other Names for Data Mining are extraction, pattern recognition, and knowledge discovery data base. It is the intersection for AI, Mathematical modeling, Statistics and management information systems. The Data in Data mining is lowest level of abstracting information and knowledge. The Types of patterns are to Association, predicting, forecasting, clustering and sequential time series. The main applications for data mining are predict changes on various prices, forecast the direction of stock fluctuations, market movements, identify and prevent fraudulent in trading. These are in adding up to the primary DM tasks prediction, association, clustering. Time-series forecasting Part of sequence or link analysis, Visualization and Another data mining task? Impacts of Data Mining in Forecasting stock price

Data mining is a key control that has foundation in statistics. Data mining has emerged in order to reveal the workable data in the databases, to remove unneeded data, and to achieve accurate data in the best feasible way. Data mining makes it easier to search for a set of rules within a huge

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amount of data in order to find some predictions about the future. With the help of extract and use precious data from a huge amount of data. Data Mining defines the forecasting stock price by techniques by using Typical Price, Bollinger Bands, Relative Strength Index, and Moving Average.

III. LITERATURE REVIEW

This researchers in the paper[7], "Financial Stock Market Forecast using Data Mining Techniques "K. Senthamarai Kannan, P. Sailapathi Sekar, M.Mohamed Sathik and P. Arumugam discussed various technique which are able to forecast with future closing stock price will increase or decrease better than level of import. Also, it investigated various overall dealings and their issues forecasting on stock markets. It supports arithmetically and graphically.

The researchers in this paper[8], "FORECASTING STOCK PRICES", 2006 by Jar-Long and Shu-Hui' This research provides a suggestion to use a two layer bias decision tree with procedural pointers to create a decision rule that makes buy or not to buy references in the stock market. An original method intended for using two-layer bias decision tree to recover purchasing precision.

These researchers in the paper [9] "Forecasting stock prices using financial data mining and Neural Network" by Amir Omidi; Esmaeil Nourani; Mehdi Jalili. The test with ANNs and to assess performance of ANN models in studying stock price patterns in time by trying to predict upcoming results of a time-series by simply learning patterns in the time-series of stock prices.

These researchers in the paper [10],"Forecasting on Stock Market Time Series Data Using Data Mining Techniques byA.Subashini, Dr. M. Karthikeyan. This definitive process future stock price indices and provides assistance for financial experts to purchasing and/or selling of stocks at the right time. The prediction results are visualized using R programming language. Results of ARIMA model have a sturdy latent for short-term prediction of stock market trends.

These researchers in the paper [11],"Stock Market Prediction Using Data Mining" by Ruchi Desai, Prof.Snehal Gandhi. They present an ideal that predicts the changes of stock trend by analyzing the effect of non- quantifiable information namely the news trainings which are rich in information and larger to numeric data.These researchers in the paper[12], "Predicting Stock Market Behavior using Data Mining Technique and News Sentiment Analysis" by Ayman E, KhedrS.E.Salama, Nagwa Yaseen.This forecast model is based on sentiment analysis of financial news and historical stock market prices. This ideal provides better accuracy results than all previous studies by considering multiple types of news linked to market and company with past stock prices. A dataset containing stock prices from three concerns is used.

IV. METHODOLOGY

The data used in carrying out the forecasting of stock price as presented in this paper were got from some Limited's in India. The data were averagely arithmetic taken by high, low and closing price from HDFC Bank Ltd[13]for the year, 2017 and 2018 were chosen for this experiment due to so many factors. The model was set up using Typical Price, Bollinger Bands, Relative Strength Index, and Moving Average by using of Data mining.

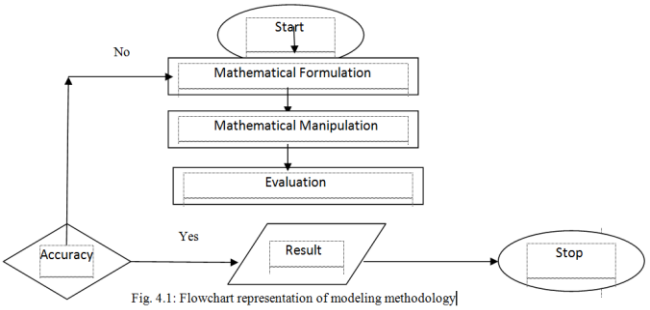

Fig. 4.1: Flowchart representation of modeling methodology

The above Fig. 4.1 is a flowchart illustration of modeling methodology. After the recognition of problem, mathematical formulation and manipulation are carried out on the problem, this leads to evaluation of the model, i.e. testing using data and finally, report is estimated.

Extraction:

Bombay Stock Exchange (India): Data Sets HDFC Bank Ltd stock price.

Historical index data for HDFC for the year 2017.

The Price Index Changes in vitality.

(Table A) shows for the BSE HDFC year 2017.

STOCK	1 YEAR	CURRENT	GAIN/LOSS
OPEN PRICE	1920.00	2149.00	
HIGH PRICE	1953.75	2165.00	
LOW PRICE	1918.55	2125.55	
CLOSE PRICE	1931.80	2146.55	11.12
VOLUME	195916	180432	-7.9

(Table A)

Historical index data for HDFC for the year 2018.

The Price Index Changes in vitality.

(Table B) shows for the BSE HDFC year 2018

STOCK	1 YEAR	CURRENT	GAIN/LOSS
OPEN PRICE	1873.00	2149.00	
HIGH PRICE	1880.20	2165.00	
LOW PRICE	1850.10	2125.55	
CLOSE PRICE	1857.00	2146.55	15.59
VOLUME	41653	180432	333.18

(Table B)

V. MODELS

In this modeling, we applied the methods Typical Price, Bollinger Bands, Relative Strength Index, and Moving Average.

The Typical price Indicator[14] for forecast

stock price is calculated by summing the High Price, Low Price and Closing Price altogether and divided it by 3. The result will be the average or typical pricing.

TP = ((high price + low price + close price) / 3)

or

Typical price = (High + Low + Close)/3.

TP = (1953.75 + 1918.55 + 1931.80)/3

For the year 2017 is

TP = 1934.7

For the year 2018 is

TP = (1880.20 + 1850.10 + 1857)/3

TP = 1862.43

Bollinger Bands:

Bollinger Bands is an instability based indicator, developed by John Bollinger, which have a number of trading applications.

There are three lines that compose Bollinger Bands:[15]
(a) Middle Band
(b) Lower Band
(c) Upper Band

These bands will move the stock price increase or decrease, respectively.

Bollinger Bands Calculation

Bollinger Bands denote (20, 2) means the stage and S.D are set to degrees. Respectively.
The indicator is calculated using the following formula.
Calculate the middle band then upper and lower.
Bollinger band with 2 Deviations and take the data sets of 2017 or 2018 then with simple moving average method
1934.7 Or 1862.43
Next, for each slab, subtract 1934.7 from the close and square this value:
1953.75 – 1934.7 = 19.05 Square it = 362.90
1918.55 –1934.7 = -16.15 Square it = 260.82
1931.80 -- 1934.7 = -2.9 Square it = 8.41

Add the above calculated values, divide by 3, and then get the square root of this value to get the deviation value:

362.9+260.82+8.41 = 632.13
632.13/3 = 210.71
Square root of 210.71 is 14.51

The upper Bollinger band would be 1934.7 + (2 * 14.51) = 1963.72

The middle Bollinger band would be 1934.7

The lower Bollinger band would be 1934.7 - (2 * 14.51) = 1905.68

Relative Strength Index

Relative Strength Index is classifying as a force oscillator that measures the stock price is period to a limited range of 14.
The RSI can be calculated by [16]
RSI = 100- 100/ (1+ RS)
RS is as (Average Gain / Average Loss)
To shorten the calculation explanation, RSI has been followed by basic works:
RS, Average Gain and Average Loss. This RSI calculation is based on 14 periods,
.
Ist Average Gain = Summation of Gains over the past 14periods (can be in months)
Ist Average Loss = Summation of Losses over the past 14 periods (months)

RSI for the year 2017 in HDFC bank closing stock price is
RSI = (100) – (100)/ (1 + (11.2)
RSI = 91.83
RSI for the year 2018 in HDFC bank closing stock is
RSI = (100) – (100)/ (1+15.59)
RSI = 93.97
The second, and following, calculations are based on the prior averages and the current gain loss:
Again= ((previous Again x 13 +current Gain))/14.
Aloss = ((previous Aloss) x 13 +current Loss)) / 14.

RSI Average Gain and Loss for the year 2017 is
Average Gain = (11.2 * 13 + 91.83)/14
Average Gain = 16.95
RSI Average Gain and Loss for the year 2018 is
Average Gain = (15.59 *13+93.97)/14
Average Gain = 21.18

Moving Average Technique Method

A moving average is a technique to get a general thought of the trend in a data set; it is a standard of any subset of numbers. The moving average is very helpful for forecasting stocks in long-term trends. The calculation can be done any time. [17]
The average prices for the year 2017, 2018 are calculated by finding the mean from the five years. This gives you the moving average for the center of 2017-2018.
The (Table C) shows the moving average sales/price of the closing stock for HDFC bank limited for the five years.

Year	Closing Price
2014	952 taken by M
2015	1082.75 taken by M
2016	1963.80 taken by M
2017	1931.80 taken by M
2018	1857.00 taken by M

(Table C)

*M is moving
(952+1082.75+1963.8+1931.80+1857.00)/ 5= 1557.47
The average for 2017 and 2018 will be (1931.8 + 1857)/2 = 1894.4 which the centered moving average.

VI. RESULTS

The above Fig (1) and Fig (2) shows the Typical Price indicator for forecast the stock price approximately as
The TP for the year 2017 is 1934.7 and The TP for the year 2018 is 1862.43

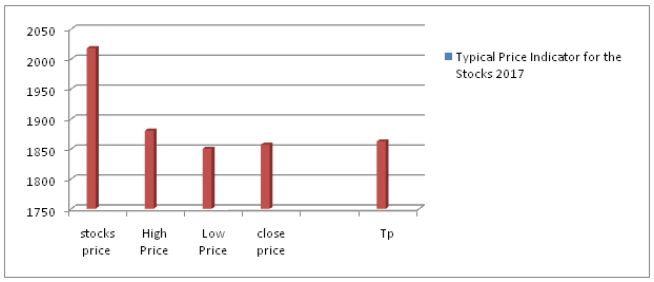

Fig (1)

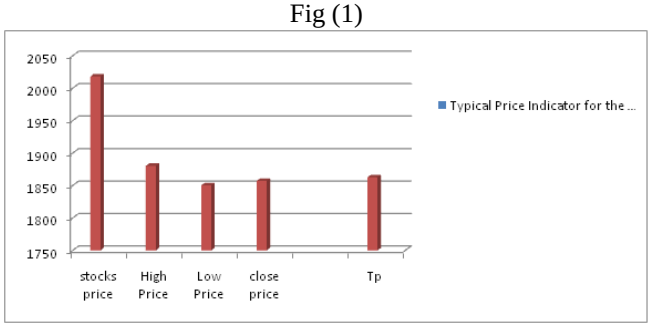

Fig (2)

Bollinger band with 2 Deviations and take the data sets of 2017 or 2018 then with simple moving average method. The Fig (3) represents nominal values of 7.576013211and7.55114162.

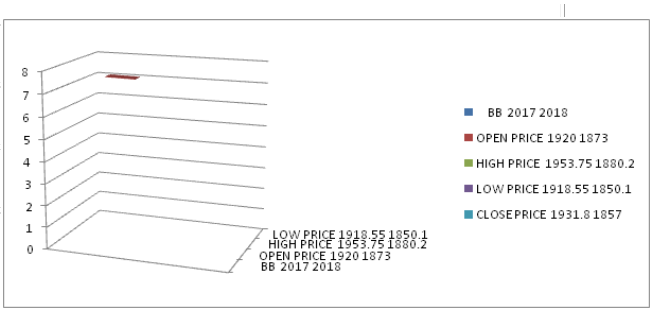

Fig (3)

The Fig (4) represents the HDFC stock price for the Bollinger band calculations: The upper Bollinger band would be 1934.7 + (2 * 14.51) = 1963.72. The middle Bollinger band would be 1934.7the lower Bollinger band would be 1934.7 - (2 * 14.51) = 1905.68

Fig (4)

The (Table D) represents Relative Strength Index is classify as a force oscillator that measures the stock price is period to a limited range of 14.

Relative Strength Index (RSI) HDFC 2017 (14 days Jan)

Date	close	change	gain	loss	Again	Aloss	RS	RSI
01-Jan	1931.8	2146.55	12.23					
02-Jan	1954	2154.9	13.44					
03-Jan	1976	2165.9		5.8				
04-Jan	1954.23	2145.4		7.8				
05-Jan	1945.8	2145.98	13.33					
06-Jan	1965.9	2134.43	14.44					
07-Jan	1965	2146.55		8.5				
08-Jan	1947.3	2146.09		7.6				
09-Jan	1988.9	2145.3	11.1		11	0.79	0.91666	47.8261

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10-Jan	1965.3	2122.21	11.23		12	0.56	21.42857	95.5414
11-Jan	1931.8	2134.6		-7.9	13	0.34	38.23529	97.45127
12-Jan	1943.2	2137.86	13.4	-7.9	12	0.46	26.08696	96.30819
13-Jan	1963.2	2146.55		-7.9	11.22	0.57	19.68421	95.16539
14-Jan	1976.3	2134.8	10	-7.9	12.33	0.65	18.96923	94.9923

(Table D)

The Fig (5) represents the RSI for the year 2017 in HDFC bank Stocks for the Jan with average gain and average loss is
RSI = (100) – (100)/ (1 + (11.2)
RSI = 91.83

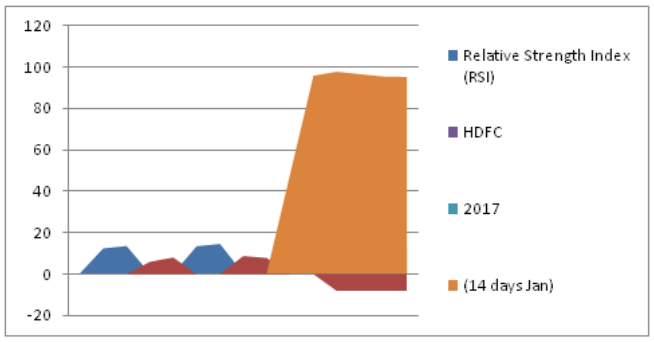

Fig (5)

The Following Fig (6) and Fig(7)shows the Moving Average for the HDFC bank for the year 2014 to 2018 by resulting 1557.47 and the centered as moving to 1894.4.

Fig(6) Moving Average Stocks HDFC

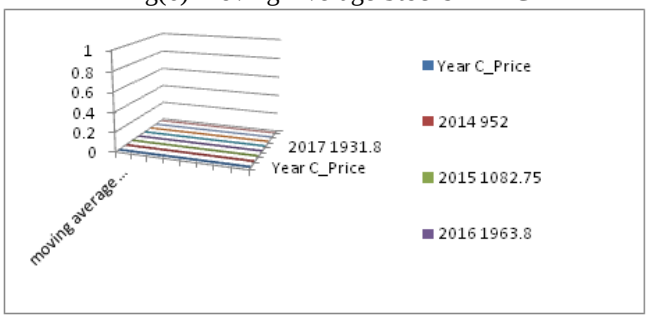

Fig (7) Line Graph HDFC Stocks

I. CONCULSION

In this paper ,we made an effort to forecast the stock market prices of the concluding stocks by developing a prediction model based on technical analysis of historical time sequences data and data mining techniques. This paper approximately predicted the stock price indices for short-term period using are Typical Price (TP), Bollinger Bands, Relative Strength Index (RSI) and Moving Average (MA). The potential of these models in finding future stock price indices which will enable shareholders to make useful investment is huge. Some disadvantages of this model as compared to its rivals is the trend to compute the mean of the historical data as forecast when it comes to long term prediction. Thus these models were some positively use for short-term rather than long-term forecasting of stock price indications.

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