



Pythagoras Expectation based Mining Technique for Stock Market Divination

S. Bhakiya, A. Akila, R. Parameswari

Abstract—Analysis of stocks will be helpful for the new investors to invest in the stock market depending on the different factors of the application. Stock market checks the daily tasks for manipulation of Sensex, sharetrading and stock market. The exchange gives way for a well-organized and open market for trading in fair, debt instruments and derivatives. Since the last decade, there is an increased need for improving the accuracy of forecasting models in various domains. This paper uses Pythagoras Expectation for Stock Market Prediction. There is a real urge to find the appropriate stock investment which would have a good return. The aim of this article is to predicate the prediction of financial movements in stock market. The proposed work is experimented using the dataset fetched from yahoo finance and the results were verified and found to be significant using ARIMA model.

Keywords—Pythagoras Expectation, Moving Average, Relative Strength Index, Moving Average Convergence Divergence, Initial Public Offer.

I. INTRODUCTION

Stock Market divination is a reserved and real art. Since its existence, Stock Market prediction has been the misery and goal of investors. Everyday huge amount of money are traded on the exchange. Behind each dollar, there is an investor hoping for profit in one way or another. Every companies have risen and fall daily based on the result of the market. The profit of investing and trading in the stock market depends on the prediction on large extend. If any system employed, which can continuously forecast the trends of the dynamic stock market would make the trade owner wealthy.

Predicting stock market increases the attention of investors as the direction of the market is successful then the investors can be guided better. The uses of investing and trading in the stock market to a large extent depends on the prediction of stocks. Apart from that, the forecasted trends will help the regulators of the market in making corrective measures.

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II. RELATED WORKS

Moving Average (MA) is a tool used to predict the data related to price. For a duration, the average is considered for prediction. Moving Average is the most common technique for prediction and suitable for both short term and long term traders. The moving average uses data collected for 200 days.

When the cost of the stock is above the moving average line, a buy signal is indicated by the tool. It indicates a sell signal when the cost is low the moving average line [1].

Relative Strength Index (RSI) is a tool to indicate the analysis of financial markets. It predicts the future and the consecutive boon or flaw of the stock with respect to the closing price of the recent trading time. It is not same as relative strength index. Relative Strength Index is used to measure the velocity and magnitude of the directional price movements. The increase or decrease of price is indicated by momentum. The relative strength index associates the present gain and loss to identify the nature of the asset which could be oversold or overbought. The Plot of the RSI has the range of 0 to 100. The stock is considered overbought, if the scale is over 70 and the stock is oversold if the RSI is less than 30 [2].

Moving Average Convergence Divergence (MACD) is also an indicator for the prediction of stock prices. The MACD alters the value above or below the zero line as the moving averages forecasts. The crossover signal line, crossover central line and divergence are used by the traders to identify price change. The threshold values used for these signals in MACD are 12, 26 and 9. The MACD looks for the signals whether it is above or below the line if it is above the stock can be bought or else the stock can be predicted again to retain the above value. There may be two types of lines, a fast line and a slow line. The 26th day and 12th day moving average is considered for the fast line. The 9th day moving average is considered for the slow line or signal line. When the fast line is above the slow line, it is considered as buy signal or otherwise as sell signal [3].

III. SCOPE

The stock market divination segregates researchers and academics as two groups based on their belief about the stock market prediction. The market will automatically capture the new information as it comes which does not give way for divination. As stock market tracks a random path, the divination should consider only the current day value. To forecast the stock market the following are necessary –



A. Selection of Input variables

The prediction accuracy is mainly achieved through the selection of input variables as it deals with the major information that is complicated nonlinear data. The main objective of selecting the input variables depends on the count of the input variables and the difference in the values.

B. Data Pre-processing

The efficiency and the authentication of the system to a high extent depend on the used data quality.

Pythagorean Expectation identifies patterns; the data which are offered to it largely influences the accuracy of the result. The regeneration of data and the relationship among them are initiated by the preprocessing of the input variables which increases learning process.

C. Preliminaries

The prediction about the market and the future of it could not be done in stock market. Stock market could result in a gain or loss due to some factors with respect to market.

D. Primary and Secondary market

Initial Public Offer (IPO) is offered by the primary market. In the share market, listing out the stock is the intention of an IPO. The shares get exchanged in the secondary market. Selling and buying shares is same as selling and buying any other thing.

E. Price determination

The price of the share is determined by the share market. Usually, when a company gets a new order or gains profit, then the share prices goes high. When the investors need to buy a stock at the time when the price goes high as the stock demand picks up. The price of share determines the demand and the supply.

F. Stock indices

The shares are listed on the Indian share market by thousands of companies. For the formation of an index, few of the similar stocks are combined together from these. The categorization is based on the size of company capitalization of market and other categories. 30 stocks comprises for the BSE Sensex and 50 stocks for NSE. Bankex, BSE Midcap, BSE Smallcap are some of the indices available.

G. Online and Offline trading

Doing trading through internet is named as online trading. The online trading could be done in office or home or any environment. The trader can login and could buy or sell shares. The trading could also be done by directly going to the office and buying the share. This is called as offline trading.

H. Role of broker

The person who support for buying and selling shares and trades is the broker. He acts as an intermediate person between the seller and buyer. They provide help for the beginners to get an idea of buying shares and which share to sell at which moment. The broker also helps in trading in the stock market. The broker will be paid for his service.

I. Trading and Demat account

The traders sell and buy shares using the trading account. The shares are hold in the demat account where the shares gets credited if the trader purchases the share and it gets debited with the share if the trader sells the share.

J. Trading and Investment

Trading indicates to short term buying and shares selling indicates to long term share buying which is considered as the major difference. Usually, a trader tries to swirl the money quickly and the investor buy a good stock and halt for the stock price to get appreciate in the share market.

K. Rolling settlements

Every order executed on the share market must be settled. Buyers receive their shares and sellers receive the sale proceeds. The settlement is the procedure wherein the buyers procure their shares and sellers receive their monies. All trades have to be settled at the end in the rolling settlement. Indian share markets adopt the T+2 settlements, which means the transactions are completed on Day One and the settlement of these trades must be completed within two working days from Day One.

L. SEBI

SEBI stands for Securities and Exchange Board of India. The stock market has its own risks, so a prediction of market is required. SEBI has the main objective to evolve and standardize the market. The main objective is to prevent investors from risk and standardizing its process.

M. Equity and Derivative market

The part of the stock markets is equity market and derivative market. The difference lies in the products traded. Shares and stocks are managed by equity market on the other hand the derivative market allocates in futures and options (F&O). The future and options market is deployed on an underlying asset like equity shares.

N. Investment

Investors can buy 1 share of a company as there is no criteria for investment. If a trader buys a stock with Rs.100/- of price and the investor buy one share then the investment of trader is Rs.100.

O. Legal charges

Central and state governments executed the GST, stamp duty and STT. The brokers doesn't get any benefit by their payments. The sole task of broker is to collect these on the behalf of traders and deposits it to the government.

IV. PROPOSED WORK

The main aim of the proposed paper is to divination the expected gain percentage. The purpose of the study is to redesign the Pythagorean Expectation formula for stock market and determine the profit percentage based on previous trending values of a stock in the current market.



A. Data Set

Data considered for the proposed work is the sample collected from Reliance communications and BTC-INR. The attributes of the dataset includes date, open, high, low, close, adj close and volume. Open and close is the trading price at which the item is bought and sold at the first day of the trade. High and low refers to the range between the maximum and minimum price of the stock. Volume is the total amount of trading done on the particular day. Figure 1 shows the sample data of Reliance Communication. The Dataset was considered

Date	Open	High	Low	Close	Adj Close	Volume
27-02-2017	527.75	527.75	507	508.85	503.8982	659925
28-02-2017	510.9	512.8	504.55	506.15	501.2244	247168
01-03-2017	511.5	521.8	509.8	513.3	508.3048	462992
02-03-2017	516	519.9	503.75	506.3	501.373	410143
03-03-2017	507.8	515	506.7	512.8	507.8097	237949
06-03-2017	514	520.65	512.4	518.35	513.3057	404637
07-03-2017	520.75	520.75	509.5	511.7	506.7205	806444
08-03-2017	505	512.75	500.3	510.2	505.235	485080
09-03-2017	510.2	519	506.5	516.1	511.0776	378355
10-03-2017	520	520	513	515.55	510.533	392891
14-03-2017	515.55	525.7	509.7	511	506.0273	1776559
15-03-2017	513.55	515.9	509.4	511.75	506.77	236900
16-03-2017	514.45	516.9	511.5	513.6	508.6019	1861758
17-03-2017	517.45	518.75	511.75	517	511.9689	665026
20-03-2017	518.9	518.9	502.1	504.55	499.64	5071627
21-03-2017	498.05	501.9	486	488	483.2511	528464
22-03-2017	485.8	502.35	484.1	484.5	479.7851	1860712
23-03-2017	488	491.75	483.25	488.1	483.3501	380688
24-03-2017	489	495.3	485	489.2	484.4394	427130
27-03-2017	490	492.95	483.75	487.2	482.4589	352310
28-03-2017	494	504.95	490.15	502.95	498.0556	8965830
29-03-2017	508	512.9	500.6	503.95	499.0459	8650617

Fig.1. Sample Dataset of Reliance Communications**B. Pythagoras Expectation**

Pythagoras Expectation is a formula that converts the open and close stock price of a share into an expected profit percentage. In regards to Pythagorean expectation, the key is to find the profit percentage that either fell woefully short of their expected profit or outperformed their expected profit by a significant margin. To correct this error, statisticians have performed many searches to get the ideal exponent. An exponent of 2 is found as the most accurate.

The profit percentage formula is based on the open and close stock prices. In this paper, two conditions are evaluated i.e., if opening price of a stock is greater than the closing price, there is a loss and taken as against and if opening price is less than the closing price, it makes a profit and taken as for. The condition checking is performed to take a count and estimate the expected profit and profit percentage. The profit percentage formula is based on the count of against and for values. The Pythagoras Expectation formula was modified for stock market prediction to estimate the profit percentage as given below,

$$PE = \frac{1}{1 + (for/against)^2} \quad (1)$$

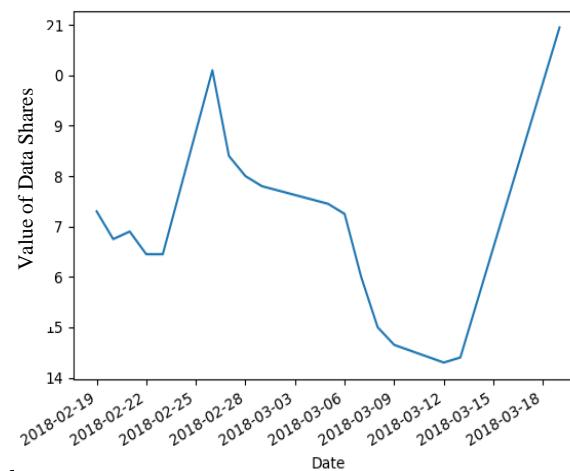
Where

PE is Pythagoras Expectation
for is Profit count ($open < close$)
against is Loss count ($open > close$)

C. ARIMA Model

ARIMA means Auto Regressive Integrated Moving Average. It gets a temporal arrangement of time data. ARIMA model is the most commonly used forecasting model which could be used for forecasting with historical data. Complex forecasting models could be built with the ARIMA model as the base.

The Auto Regressive of ARIMA specifies that the emerging variable of interest is reverted on its own covered values. The Moving Average of ARIMA specifies that the regression is a linear mixture of error terms occurred currently and at the past. The Integrated part of ARIMA specifies that the present data value overlaps the previous data. The main objective of ARIMA model is to build a model that can have many data. Figure 2 shows the graph generated through ARIMA Model.

**Fig.2. Graph plot generated using ARIMA model****D. Experimental Setup and Result**

The experiments are conducted on a 1.70GHz Intel i3-dual core system built with x64 bit architecture with 4 GB ram running Microsoft Windows 10 Home Edition. The algorithms are implemented using Python 2.7. An analysis made to evaluate the performance of the proposed techniques. The efficiency of dataset is evaluated using stock market dataset. The required data from the dataset is read and is computed using the PythagoreanExpectation formula and the profit percentage is predicted. If the predicted percentage is above 50 then there is a profit, if invested on the shares of that company/organization.

The prediction graph is shown using ARIMA model plotting the time(daily/monthly/weekly) on the x-axis and the value of the shares from the dataset on the y-axis.

ARIMA model gives us graphical representation of the fluctuations in the share values with time and foresights the share values. Thus aiding the investors to plan the investment on the stock market after 18-03-2018 will yield a profit of 40% that is predicted by Pythagoras Expectation.

V. CONCLUSION

Assessing the prediction of stock market for analysis has been a hard task. Every method comprises its strengths and weaknesses. Thus, the investors make use of vast Pythagoras Expectation to predict the indices of the stock market. The correctness in prediction can be gained when the investors join the techniques of time series analysis. This prediction model can be used by the financial analysts and the investors to take decisions related to trading by checking the expected percentage based on market behavior.

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