Stock Market Prediction Using Technical Analysis

Prof. Dr. Preeti Bhamre, Devwrat Nevewani, Prajwal Jadhav, Neha Pipada, Divyal Shewale
Department of Information Technology, K. K. W. I. E. E. R., Nashik, India

Abstract- Stock prices are volatile in nature. Stock prices are affected by variety of factors namely fundamental factors, technical factors and market sentiments. Fundamental factors like earning base and valuation multiple that drive stock prices are based on a company's earnings and profitability from producing and selling goods and services. technical factors like Inflation, Economic strength of market and peers, Incidental Transactions, Demographics, Liquidity relate to a stock's price history in the market pertaining to chart patterns, momentum and behavioral factors of traders and investors. The proposed work intends to make use of fundamental and technical factors to provide efficient stock trend's prediction. The trends obtained create opportunities for investors to make money that act as lucrative option in their annual income. The paper discusses strategies for obtaining useful data from NSE (National Stock Exchange), Investopedia and Money Control websites using web scraping libraries in python and storing same data in several files like .csv and excel. The stored data allows a proposed algorithm to perform feature wise analysis and obtain pattern recognition in stock prices data. This results in accurate investment and thereby leading to high profits for investors. imperceptibility.

Keywords – Stock Market, Technical Parameters, NSE

I. INTRODUCTION

Stock price trend prediction is a task, which arouses curiosity and catches the attention. This kind of prediction becomes fascinating when it involves money and risk. There are many approaches for prediction of stock, Regression based models[1] like Autoregressive Integrated Moving Average can be used to predict scaled and un-scaled net income[2], Deep learning algorithms like Artificial Neural Network(ANN), Convolution Neural Network (CNN)are also used now days to model stock market data[3]. Additionally, stocks are also selected based on a present price to earnings (P/E) ratio[4]. For making all this analysis the historic data must be made available. This will make prediction more accurate, which is always desired.

Indian stock market marks to be one of the oldest stock market in Asia. Initially, when the stock market was new less people used to risk their money, but now a day's smart investors have started making good profits and over the time now due to competition and cheap internet almost everyone has become an investor. Due to this the market doesn't remain stable and investment is always at high risk.

II. PROPOSED SYSTEM

2.1 System Architecture –

The following section presents the proposed system architecture as shown in Fig.1 to achieve the objectives of work.

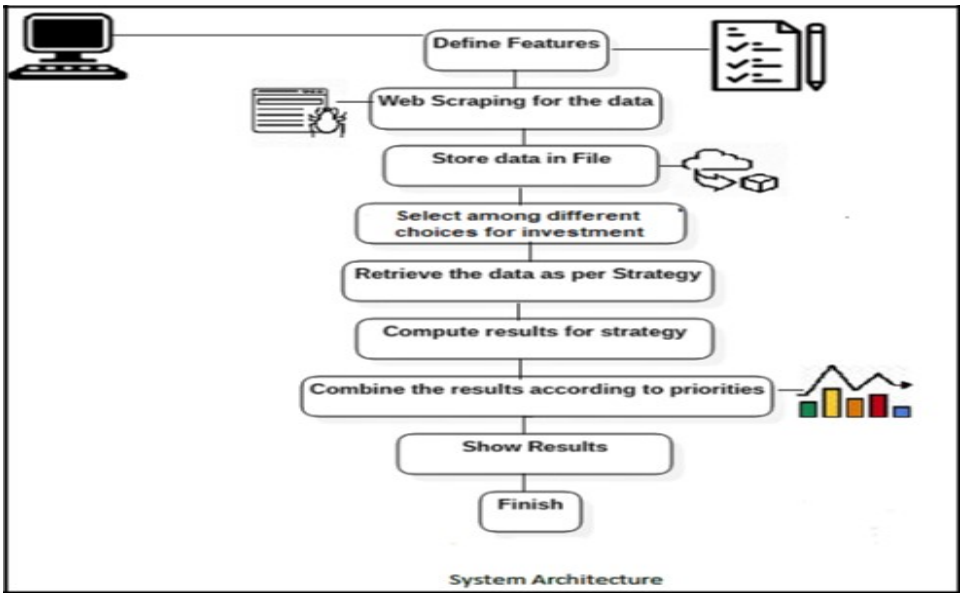

Figure 1. System Architecture

Table I show the features columns name and will have the calculated data. These columns are the technical indicators using which data is analyzed for predictions. The Table I will be a .csv file stored in the database, where each stock will have individual table and calculations will be performed individually.

Sr.No.	Features
1	Date
2	Open
3	Close
4	High
5	Low
6	Heikin-Ashi Open
7	Heikin-Ashi Close
8	Heikin-Ashi High
9	Heikin-Ashi Low
10	Return on capital employed (ROCE)
11	Return on equity(ROE)
12	Relative strength index RSI (14D)
17	Deliverables
21	Last 15D Deliverables max(7) avg
22	Standard Deviation - 20D
23	Bollinger UpperBand
24	Bollinger LowerBand
25	MACD *(*moving average convergence and divergence) line
26	MACD Signal Line
27	MACD Histogram

Figure2. Parameters Used for score calculation

2.2 Parameter Calculation & Proposed Algorithm–

Parameters required for stock analysis are calculated using the data scraped from NSE websites.
These parameters are calculated as following-

A. Heikin-Ashi (HA)-

The Heikin-Ashi[5] technique averages price data to create a Japanese candlestick**.** A candlestick is a type of price chart used to display the high, low, open, and closing prices of a security for a specific period.

$$\textbf{HA-Close = (Open + High + Low + Close)/4} \quad \textbf{…} \ (1)$$

$$\textit{HA-Open= [Open (previous bar) + Close (previous bar)} \quad \ldots \ (1.1)$$

$$\text{HA-High = Max (High, HA-Open, HA Close)} \quad \ldots \ (1.2)$$

$$\text{Low = Min (Low, HA-Open, HA-Close)} \quad \ldots \ (1.3)$$

The pseudo-code of Heikin-Ashi is-

If *(last 9/10 candles green)* {Assign 100 points to HA score in Score table}
Else if *(last 2 candles green and last 7/10 candles red)* {Assign 80/100 points to HA score in Score table}
Else if*(last 4 candles green and last 5/10 candles red)* {Assign 60/100 points to HA score in Score table}
Else if*(last 2 candles green and last 5/10 candles red)* {Assign 40/100 points to HA score in Score table}
Else {Assign 20/100 points to HA score in Score table}

B. ROCE (return on capital employed) -

It measures the company's profitability and the efficiency with which the capital is used, which means how well a company is generating profits from its capital. To get points for high accuracy multiply ROCE by market cap/1000 in results of proposed model.

C. ROE (return on equity) –

Return on equity (ROE) is measure of financial performance calculated by dividing net by shareholders' equity. To get points for high accuracy multiply ROE by market cap/1000 in results of proposed model.

D. RSI (relative strength index) –

The relative strength index (RSI)[6] is a momentum indicator that measures the magnitude of recent price changes to evaluate overbought or oversold conditions in the price of a stock or other asset. It gives market insight in terms of demand and supply of stock.

Figure2. Relative Strength Index

Where RS is Relative Strength, AvgU is an average of all up moves in the last N prices as shown in above figure, AvgD is an average of all down moves in the last N prices as shown in above figure

$$\mathbf{RSI = 100 - 100 / (1 + RS)} \quad \text{… (2)}$$

Using Equation (2). RSI is calculated where; RSI line can then be plotted alongside an asset's price chart.

N is the period of RSI[7]. The value of N is considered as 14 .Fig.2 shows checking the oversold, overbought as well as movements of stock prices for 14 days.

There are three types of moving average - Simple Moving Average (SMA), Exponential Moving Average, Wilder's Smoothing Method. Simple Moving Average (SMA) is commonly used as it provides a more stable level indicating support or resistance.

E. SMA (simple moving average)–

Simple Moving Average is calculated by closing price of stock for previous five days. It acts like a support in upward trend and as a resistance in downward trend which can be used as indicator for analysis.

The pseudo-code of SMA is-

Calculate RSI

If *(50<RSI value<70)* {Assign 80/100 points to RSI score in Score table}

Else if*(RSI value>70)* {Assign 60/100 points to RSI score in Score table}

Else if *(30<RSI value<50)* {Assign 20/100 points to RSI score in Score table}

Else {Assign 0/100 points to RSI score in Score table}

F. Bollinger band –

Bollinger band trails the price action of an underlying asset, and experts use it to generate transaction signals or confirm the strength of a given trend. Bollinger Band makes use of Standard Deviation for last 20 days simple moving averages (SMA) to calculate Bollinger Upper Band and Bollinger Lower Band.

Bollinger Upper Band = 20 days simple moving average + Standard Deviation.

Bollinger Lower Band = 20 days simple moving average - Standard Deviation.

The pseudo-code of Bollinger band is –

If *(all other indicators indicate strong buy)*
{
    If *(movement lower to higher and have crossed SMA of 20 days)*
        {Assign 60/100 points to Bollinger band score in Score table}
}
Else {Assign 40/100 points to Bollinger band score in Score table.

G. MACD (moving average convergence and divergence) -

MACD (moving average convergence and divergence) is the Leading technical indicator.
Exponential moving average is calculated as:

[Close - previous EMA] * (2 / n+1) + previous EMA.

MACD line is calculated as difference of 12-days EMA and 26-days EMA.

Signal line is calculated as nine days EMA of MACD line.
MACD Histogram is calculated as difference of MACD line and Signal line.

The pseudo code of MACD is-
If *(crossover at -4 or less)* {Assign 320/400 points to MACD score in Score table }
Else if *(crossover at -2 to -4)* {Assign 240/400 points to MACD score in Score table}
Else {Assign 80/400 points to MACD score in Score table

2.3 Score Calculation –

Table II. Score Table

Sr.No.	Attributes
1	Stock Name
2	Last updated date
3	Time
4	ROCE Score
5	ROE Score
6	MA Score
7	Deliverables Score
8	RSI (14D) Score
9	Bollinger band score
10	MACD Score
11	HA score
12	Total Score

Table II. is a Score table where all the stock date is combined for score calculation according to indicator performance. Later this table is sorted according to total score of stocks and top 10 stock names are obtained by the user.

	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	HA_open	HA_close	HA_high	HA_low	HA_colour	RSI(14day	sma_20_d	bollinger_	bollinger_	EMA_12D	EMA_26D	MACD_lin	signal_line
2	436.7022	429.8625	436.7022	426.2	red	45.18753	438.6288	462.7621	414.4954	405.8185	411.8671	-6.04867	-7.90454
3	433.2823	430.6	433.7	427.8	red	47.8973	438.1738	462.4539	413.8937	405.3178	411.178	-5.86023	-7.49568
4	431.9412	429.4625	434.8	423.5	red	43.82524	436.9088	461.1557	412.6618	403.9118	410.067	-6.15514	-7.22757
5	430.7018	423.4813	430.7018	420.15	red	41.6011	435.2325	458.9929	411.4721	402.1486	408.7621	-6.61347	-7.10475
6	427.0915	426.0375	429.95	420.5	red	46.94715	433.7162	455.0239	412.4086	401.7142	408.0631	-6.34883	-6.95357
7	426.5645	431.575	436.125	426.5645	green	50.82548	432.8625	452.5762	413.1488	402.1927	407.8231	-5.63045	-6.68894
8	429.0698	432.8125	438.35	427.05	green	46.9131	431.725	449.7114	413.7386	401.7013	407.1695	-5.46816	-6.44479
9	430.9411	427.7188	430.9411	424.3	red	46.28384	430.5262	446.2627	414.7898	401.1386	406.4935	-5.35491	-6.22681
10	429.3299	425.0688	432	419.05	red	42.63391	429.7475	445.7537	413.7413	399.7913	405.4481	-5.65686	-6.11282
11	427.1993	423.3063	427.1993	421.05	red	44.94294	429.66	445.7719	413.5481	399.0814	404.6873	-5.6059	-6.01144
12	425.2528	423.05	425.2528	420.5	red	43.97399	429.7463	445.6835	413.809	398.2621	403.8776	-5.61548	-5.93225
13	424.1514	417.9688	424.625	412.05	red	39.30619	429.4	446.3039	412.4961	396.4503	402.5893	-6.13896	-5.97359
14	421.0601	410.2563	421.0601	400.725	red	34.81598	428.6425	448.1426	409.1424	393.6554	400.7888	-7.13344	-6.20556
15	415.6582	405.1875	415.6582	398.225	red	34.58631	427.5225	449.508	405.537	391.2224	399.089	-7.86661	-6.53777
16	410.4228	411.8625	416.45	409	green	41.28247	426.5663	449.3181	403.8144	390.257	398.0415	-7.78444	-6.7871
17	411.1427	414.1313	419.5	406.55	green	45.25939	424.9475	445.1502	404.7448	390.1608	397.4185	-7.25773	-6.88123
18	412.637	415.0063	419	410.7	green	41.80089	423.3675	442.2883	404.4467	389.262	396.4481	-7.18616	-6.94221
19	413.8216	415.1313	418.05	413.025	green	45.05336	422.065	439.0306	405.0994	389.0894	395.8327	-6.74334	-6.90244
20	414.4764	425.225	434.75	414.4764	green	55.77994	421.9713	438.6725	405.27	391.313	396.4038	-5.09087	-6.54013
21	419.8507	439.8	449.5	419.8507	green	62.70691	422.87	442.7444	402.9956	395.288	397.9407	-2.65262	-5.76262
22	429.8254	449.65	454.4	429.8254	green	64.59876	424.08	447.6528	400.5072	399.3148	399.683	-0.36819	-4.68374
23	439.7377	456.6	462.375	439.7377	green	68.02622	425.5475	454.0283	397.0667	404.0233	401.9228	2.100558	-3.32688

a_reliance_data

FIG. 4: ACTUAL COMPUTATION OF SCORE TABLE ATTRIBUTES

III. RESULTS & ANALYSIS

FIG.4 ACTUAL RESULT

Fig. 4 is actual result obtained from implementation of Technical indicators algorithm in proposed model. The following result is obtained on May 23, 2019 at 3.07pm Which lists top 10 stocks for short-term investment.

The top stock in the list is KEI stock. The actual and predicted stock trends were seen the exact from May 23, 2019 to May 30, 2019 as shown in Fig. 5.

Fig. 5: Predicted result of KEI.

The second top stock in list is KALPATPOWER. The Fig. 6 shows the predicted trend from May 22, 2019 to May 28, 2019. The actual and predicted results were exact, that shows upward trend of Kalpatpower stock.

IV.CONCLUSION

Stock Market indicators in brief were considered for calculations of all the stocks listed on NSE (National Stock Exchange). There are 800 stocks listed on NSE, the proposed model will compute stock importance considering technical and some fundamental parameters. Results obtained shows high accuracy rate of predictions of stock trends.

The future work will be to make the priority of default features more accurate and relieve the users from the task of feature selection and prioritizing them. It will increase the accuracy of predictions.

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