Prediction Of Stock Trend For Swing Trades Using Long Short-Term Memory Neural Network Model

Varun Totakura, V. Devasekhar, Dr. Madhu Sake

Abstract— The accuracy of forecasting is the most important factor in selecting any forecasting methods. Research efforts in improving the accuracy of forecasting models are increasing since a long time. The appropriate stock selections those are suitable for investment is a difficult task and is very important for a trader to earn profits. The key factor for each investor is to earn maximum profits on their investments. Numerous techniques used to select the stocks in which fundamental and technical analysis are one among them. In our paper, we have given a keen insight about the selection of stocks using Relative Strength Index (RSI) for swing traders and a Machine Learning (ML) model for predicting the RSI values using historical time series stock data. We have used Long Short-Term Memory (LSTM) Neural Network Model to do the future prediction of trend of stocks in this paper.

Index Terms— Relative Strength Index, Machine learning, LSTM, Stock Selection, NSE, BSE.

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1 INTRODUCTION

A stock market is a gathering of buyers and sellers of stocks in a single platform. Before BOLT was introduced in 1995, people used to trade standing in the trading ring. Nowadays, all trading happens in computer terminals at the broker's office or on the internet. Share market and the stock market is one and the same thing. Most of the trading in the Indian stock market takes place on its two stock exchanges: The Bombay Stock Exchange (BSE) and the National Stock Exchange (NSE). The BSE has been in existence since 1875. The NSE, on the other hand, was founded in 1992 and started trading in 1994. However, both exchanges follow the same trading mechanism, trading hours, settlement process, etc.   Almost all the significant firms of India are listed on both the exchanges. NSE enjoys a dominant share in spot trading, with about 70% of the market share, as of 2009, and almost a complete monopoly in derivatives trading, with about a 98% share in this market, also as of 2009. Both exchanges compete for order flow that leads to reduced costs, market efficiency, and innovation. The presence of arbitrageurs keeps the prices on the two stock exchanges within a very tight range. Swing trading is a kind of trading where the traders take advantage of short term moments which probably long from few days to several weeks. Most of the traders in swing trade take advantage using the technical indicators provided by their brokers. The goal of swing trading is to capture a chunk of a potential price move. While some traders seek out volatile stocks with lots of movement, others may prefer more sedate stocks. It basically comprises of two types of long and short. Long is where we buy a stock at a certain point and sell it when our target is reached. Short is a type where we first sell the stock and then buy it after the target getting hit. Short option is provided by all the major brokerages in India. RSI (Relative Strength Index) is an indicator which was originally

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developed by J. Welles Wilder Jr. and introduced in his seminal 1978 book, New Concepts in Technical Trading Systems. It is a momentum indicator which takes count on the price of the stock and indicates overbought and oversold levels. It is basically a scale of 100 where the overbought levels are above 80 and oversold levels are below 20. We can expect a reversal in the stock after it reaching the overbought or oversold levels. Long Short-Term Memory (LSTM) is a ML model which is widely used for prediction of time series data or sequence related problems. They are widely used as they are highly effective and produces accurate results. LSTM is an updated version of Recurrent Neural Network (RNN). LSTM follows a mechanism where they are able to store the previous data and forgets the data that is not required. Each LSTM cell has three gates: Input gate, forget gate and output gate. This paper consists of problem statement, proposed methodology, conclusion and future work. Where we explain in detail about the selection of stocks using RSI. We have used Python language with Keras Deep-Learning module to write the code.

2 LITERATURE REVIEW

Adrian Et Al. [1] has published a paper in which they have told like, in comparison with the classic form of the indicator and for the period taken into account, the RSI version proposed by us generated a higher gain when using a different and even opposite interpretation from the classic one and much greater losses in the reverse situation. Therefore, the study concludes that by analyzing the results of the research, the extreme values of the RSI and RSIM do not indicate the return of a trend but the continuation of its direction, at least for the short term. So, the classic interpretation is useless while the reversed interpretation gives positive results for both forms of the indicator. The proposed method of Hari Et Al. [2] says that, the main output is that the system helps to indicate the time to buy, sell, overbuy, oversold and neutral. Thus, it can help the investor to reflect and prove the decision making. Furthermore, the system can help to analyze the historical price data at the selected time interval. The time interval can also affect the result of the prediction, especially the moving average result. Based on the user experience survey, the ease of use in the system is acceptable. Lastly, the system cannot determine the loss or profit, thus this system can only indicate the right time to buy or sell, but all the decision is up to the trader. In the paper published by Pooja Et Al. [3], the RSI

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reversal concept applies to all time frame and gives a clear understanding of market trends and also forecasting of market directions. This concept of relative strength is useful not only in highlighting promising investments, but also in enabling you to judge your own performance. While a variety of relative strength measures are available to investors, all attempt to capture stocks showing stronger price movement than that shown by the overall market. Like all investment techniques, proper use requires a careful study and understanding of the factors driving the stock price movement. Bhargavi Et Al. [4] has presented a paper in which they have told, we can clearly find that RSI is one of the most effective technical analysis tools available, it can be effectively used to create a portfolio. Just as it performs well in other stock markets around the world, it also works well in Indian stock market. It has also been found out that P/E ratio better reflects the performance of an organization when compared to EPS. Although RSI in itself is a very powerful analytical tool, using fundamental analysis and other technical analytical tools along with it gives better results. In the paper presented by Hochreiter Et Al. [5], they have told about the LSTM and its architecture along with the mathematical interpretations that each cell in the LSTM carries in its process. They have even told about the constant error flow within CEC, and the methods to reduce the error by using two gates for input and output flow of error. So, finally they have concluded that their model will give an error free flow of the data in each memory cell of LSTM. Sang Et Al. [6] have published and proposed about the Long Short-Term Memory Neural Network for the stock prediction. In which, the prediction of stock only depends on the previous price movements and that too it is for the long term predictions rather than intraday or for few days which makes a normal trader difficult to earn profit as he has to spend number of days in watching the stock trend and taking the corresponding action accordingly.

3 PROBLEM STATEMENT

The research problem undertaken in this study is to provide inputs trading strategies. There are about 5000 stocks or scripts available in BSE and more than 1600 scripts are in NSE which makes a trader to become confused to select the right stock in the right period or movement. The selection of the stocks from those huge number of the stocks is not an easy task, it requires a strategy and tools to refine the stocks. Thus, the selection of the right script or stock at the right movement will help the traders to be successful in their trades. As in many cases, investors suffer due to wrong selection of securities in a portfolio. Selection of inappropriate securities may lead to losses being suffered by the investor. And it very difficult to find the appropriate stock or script accurately. In order to overcome this, many tools are available of which RSI is a powerful analytical tool which will help the investor choose the right combination of securities for their portfolio construction. Even there are many methods available in the market, RSI have its own specifications that helps the RSI to be main tool for the technical traders. The scope of the study is confined to select very few companies listed in NSE. The main objective of this study is to test the validity of RSI results in trading strategies in short term and in the long term market trends and trades.

4 PROPOSED METHODOLOGY

Relative Strength Index is a powerful tool which helps

investors to make investment decisions. To add credence, testing and validation of RSI will be of help, particularly for portfolio construction. The use of RSI helps in minimizing the risk and maximizing the return in respect of the portfolio. The proposed methodology is basically of following mentioned six phases. They are:

1. Taking the Input stocks and select the stocks as per the mentioned strategy.
2. Get the history data of the stocks.
3. Calculate the Average gain and Average Loss of the stock.
4. Calculate the RSI for the stock.
5. Select the best stocks as per the previous day RSI level.
6. Prediction of RSI for selected stocks using LSTM.
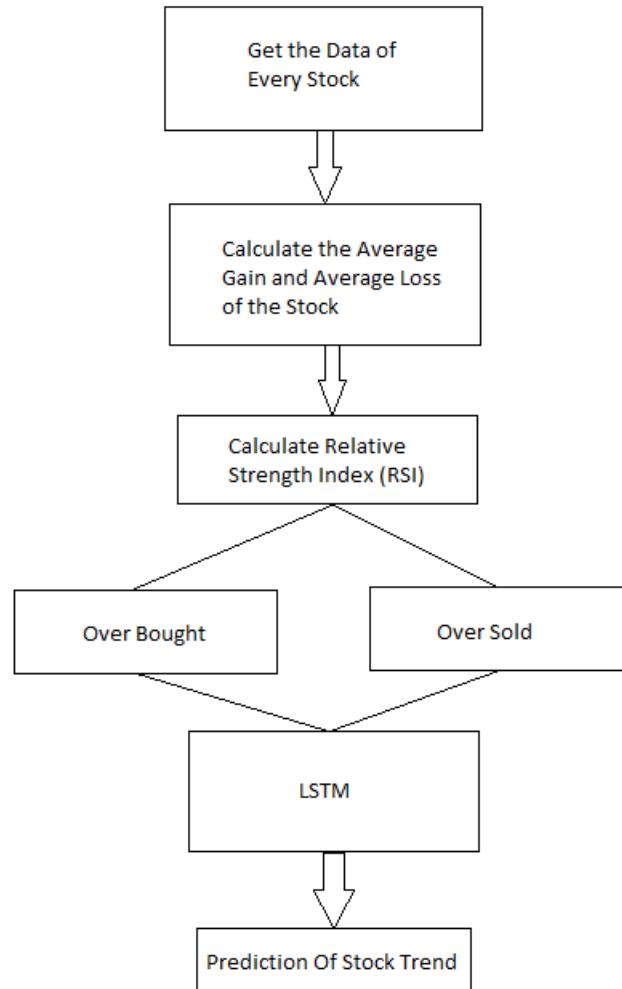
Figure – 1: Proposed Model Architecture.

4.1 INPUT STOCKS

Data cleansing or cleaning is the process of identifying and rectifying the corrupt or inaccurate data from a database. In this case, get the previous day stocks data into an excel sheet. Sort out the stocks as per their last traded price (LTP) or value in ascending or descending order. Delete the stocks with more than Rs. 10,000 as LTP and also the stocks with less than Rs. 50 as LTP. Save the excel sheet and this sheet will be used for the further analysis.

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Exchange	Scrip Name	% Change	Last Traded Qty	LTP	Open	High	Low	Close	Qty
NSE	CTE	1.22	2	33.2	31.1	34.9	31.1	32.8	4641
NSE	BHARATWIRE	0.45	9	33.25	33.1	33.5	33.1	33.1	6651
NSE	BANG	-3.38	19	37.15	38.2	39	35.6	38.45	18352
NSE	FACT	0.53	20	37.75	37.55	39.05	36.55	37.55	188375
NSE	PRIMESECU	-2.34	434	39.65	40.45	40.45	37.2	40.6	136838
NSE	MASKINVEST	-0.25	1	39.9	38	39.9	38	40	101
NSE	PALASHSECU	17.20	100	41.9	34	42.9	34	35.75	29682
NSE	ATLASCYCLE	0.84	3	42	42	43	41.3	41.65	11284
NSE	RSYSTEMS	-3.19	278	42.5	43.65	43.65	42.1	43.9	7448
NSE	OMAXAUTO	-2.22	99	46.35	48	48.5	43.55	47.4	14998
NSE	FILATEX	0.41	1000	48.75	47.6	49.5	47.15	48.55	423136
NSE	TOKYOPLAST	-3.86	50	49.75	50.6	52.55	49.1	51.75	11426
NSE	XCHANGING	-1.68	100	52.65	53.85	53.85	51.65	53.55	3844
NSE	WELSPUNIND	1.49	372	57.9	57.05	58	56.1	57.05	2371088
NSE	CAMLINFINE	-1.92	50	58.9	60.05	61.7	58.2	60.05	336052
NSE	OPTIEMUS	-0.79	5000	62.85	63.9	64.4	62.1	63.35	84587
NSE	BANSWRAS	0.45	1	67	65.3	67.25	65.3	66.7	1960
NSE	PRABHAT	-2.61	2	67.15	69.7	69.7	66.5	68.95	92046
NSE	AXISCADES	0.97	100	67.55	66.4	68	65.05	66.9	524824
NSE	JINDWORLD	-2.00	13	68.75	70.5	70.5	66	70.15	63287
NSE	KREBSBIO	-2.52	29	71.55	72.25	76.95	71.55	73.4	1648
NSE	JSWENERGY	0.63	1	72.2	72.3	73.5	70.75	71.75	611636
NSE	SPECIALITY	-5.53	8	75.95	80.45	81.4	75.1	80.4	23419
NSE	BLS	3.96	10	84	80.8	85.5	78	80.8	138719
NSE	ADHUNIKIND	0.81	29	86.75	86.5	87.75	86	86.05	11890
NSE	GTPL	0.06	82	89.3	89	91.8	84.55	89.25	243286
NSE	NBVENTURES	-3.31	10	90.6	93	93.9	90.1	93.7	58215
NSE	INDIACEM	-0.05	250	98.65	100.5	101.5	96.85	98.7	3073673
NSE	ALLCARGO	-0.65	2	99.6	101	101	97.65	100.25	85097

Table – 1: List of all the Stocks and the required parameters

Exchange	Scrip Name	% Change	Last Traded Qty	LTP	Open	High	Low	Close	Qty
NSE	OPTIEMUS	-0.79	5000	62.85	63.9	64.4	62.1	63.35	84587
NSE	OBEROIRLTY	-1.36	64	561.85	573.15	577	549.65	569.6	250515
NSE	KOTAKBANK	-2.56	3	1498.9	1540	1540.75	1490	1538.25	2094229
NSE	STRTECH	1.22	25	165.6	165.9	172.3	160	163.6	3567525
NSE	PRABHAT	-2.61	2	67.15	69.7	69.7	66.5	68.95	92046
NSE	DENORA	-3.82	6	223.95	228.05	238.85	219.05	232.85	5091
NSE	FACT	0.53	20	37.75	37.55	39.05	36.55	37.55	188375
NSE	BEML	-0.20	3	912.05	920	947.9	910.35	913.9	2145912
NSE	HAVELLS	-0.07	1	717.05	718.2	722.7	705.1	717.55	1223141
NSE	INDORAMA	1.28	158	27.6	27.1	28.35	25.05	27.25	21160
NSE	GAEL	-0.36	3998	138.65	140	140	137	139.15	24482
NSE	GODREJPROP	-2.71	10	950.75	982	985.4	945.25	977.25	273752
NSE	DEEPAKNTR	-2.05	100	302.7	309.05	309.9	300.5	309.05	199497
NSE	RNAM	0.02	1	227.1	227.5	227.9	226.6	227.05	796102
NSE	PIDILITIND	-2.65	3	1195.35	1229	1230.4	1192.05	1227.85	468517
NSE	KREBSBIO	-2.52	29	71.55	72.25	76.95	71.55	73.4	1648
NSE	INSECTICID	-1.87	12	668.05	682.3	689.9	660	680.75	10295
NSE	AMBER	0.63	39	833.15	820.05	854	820.05	827.9	9841
NSE	TOKYOPLAST	-3.86	50	49.75	50.6	52.55	49.1	51.75	11426
NSE	BFINVEST	0.04	2	270.7	272.05	281.5	268.5	270.6	305080
NSE	NEOGEN	0.00	0	0	0	0	0	0	0
NSE	SSWL	0.13	1	783.35	779.4	789.6	767	782.3	15985
NSE	APOLLOHOSP	-1.05	10	1373.45	1388.15	1398.95	1367.05	1388.05	294619
NSE	THEINVEST	-0.22	833	134.7	134	138	121	135	14153
NSE	FOSECOIND	-0.91	2	1218.8	1248.95	1248.95	1211.4	1229.95	296
NSE	RADICO	1.68	1000	287.4	284.5	291.95	280.25	282.65	287967
NSE	RSYSTEMS	-3.19	278	42.5	43.65	43.65	42.1	43.9	7448
NSE	DIVISLAB	-1.07	45	1624.4	1644.1	1659.9	1620.05	1641.9	464691
NSE	NCLIND	0.94	25	123.65	122	127	121.4	122.5	22553
NSE	INDIANCARD	0.00	0	0	0	0	0	0	0

Table – 2: List of all Stocks to be removed (LTP < 50)

The deletion of the stocks with less than Rs. 50 is just because these stocks will have less volatility even in a trendy market. The market is said to be trendy if the market chooses a trend and follow the trend (either raise of the prices or decrease of the prices). A volatile market is a kind of situation in the market where the prices will not follow the trend of the market and either increases or decreases (go up or fall down in value). These stocks will not have any changes in their prices even in a volatile market. The reason behind the deletion of the stocks with more than Rs. 10,000 is that these stocks require a high amount of investment and have will show a massive response or highly volatile which makes an investor to lose their money easily. Due to the above mentioned reasons and for the ease of the investors in our proposed strategy we try to remove these kind of stocks.

4.2 HISTORY OF THE STOCKS
From the selected stocks which are sorted out using the above phase are taken and the history of each stock is considered. History of the stock refers to the previous data of the stock. Here, we take the previous day's data from each stock. The

	Symbol	Prev Close	Open	High	Low	Last	Close	Change	Gain	Loss
Date										
2018-12-03	ACC	1485.50	1497.00	1530.00	1484.10	1514.90	1516.80	31.30	31.30	0.00
2018-12-04	ACC	1516.80	1519.00	1529.55	1501.00	1508.35	1508.95	-7.85	0.00	7.85
2018-12-05	ACC	1508.95	1504.00	1506.50	1465.85	1470.00	1471.15	-37.80	0.00	37.80
2018-12-06	ACC	1471.15	1462.00	1462.00	1416.85	1417.95	1423.80	-47.35	0.00	47.35
2018-12-07	ACC	1423.80	1426.00	1447.65	1426.00	1438.25	1443.05	19.25	19.25	0.00
2018-12-10	ACC	1443.05	1419.65	1432.80	1398.25	1417.00	1411.80	-31.25	0.00	31.25
2018-12-11	ACC	1411.80	1385.00	1439.85	1385.00	1431.75	1432.85	21.05	21.05	0.00
2018-12-12	ACC	1432.85	1441.25	1489.95	1430.20	1480.00	1485.20	52.35	52.35	0.00
2018-12-13	ACC	1485.20	1499.45	1512.00	1481.55	1510.35	1500.85	15.65	15.65	0.00
2018-12-14	ACC	1500.85	1530.50	1541.65	1490.00	1490.30	1497.65	-3.20	0.00	3.20
2018-12-17	ACC	1497.65	1504.00	1513.90	1495.05	1503.60	1502.00	4.35	4.35	0.00
2018-12-18	ACC	1502.00	1499.80	1510.00	1490.35	1507.15	1501.25	-0.75	0.00	0.75
2018-12-19	ACC	1501.25	1516.00	1573.00	1508.00	1547.30	1543.90	42.65	42.65	0.00
2018-12-20	ACC	1543.90	1538.30	1562.00	1528.85	1536.75	1537.25	-6.65	0.00	6.65
2018-12-21	ACC	1537.25	1534.90	1539.00	1481.00	1490.00	1490.05	-47.20	0.00	47.20
2018-12-24	ACC	1490.05	1479.00	1485.95	1439.35	1439.50	1447.65	-42.40	0.00	42.40
2018-12-26	ACC	1447.65	1442.30	1486.00	1421.10	1482.00	1479.40	31.75	31.75	0.00
2018-12-27	ACC	1479.40	1499.00	1499.00	1453.85	1457.90	1459.20	-20.20	0.00	20.20
2018-12-28	ACC	1459.20	1465.00	1493.00	1465.00	1478.00	1479.70	20.50	20.50	0.00
2018-12-31	ACC	1479.70	1486.00	1511.90	1470.85	1508.00	1508.10	28.40	28.40	0.00
2019-01-01	ACC	1508.10	1516.90	1516.90	1475.00	1487.00	1488.80	-19.30	0.00	19.30
2019-01-02	ACC	1488.80	1487.85	1501.95	1477.55	1478.20	1483.95	-4.85	0.00	4.85
2019-01-03	ACC	1483.95	1483.95	1492.70	1445.40	1446.00	1452.25	-31.70	0.00	31.70
2019-01-04	ACC	1452.25	1458.00	1473.00	1437.55	1469.00	1469.10	16.85	16.85	0.00

example of this phase is as shown as below:
Table – 3: History of the stock "ACC" with gain and loss of the stock.

The above picture tells us that the script or stock name "ACC" is taken from the script list and the history of the data is taken for that script. This phase is used by the next phases and it plays a major role in the selection of the stocks.

4.3 CALCULATION OF AVERAGE GAIN AND AVERAGE LOSS
The history of the stock is used in calculating the average gain and average loss of the stock. The below mentioned formula

$$\text{Average Gain} = \frac{(\text{Total Gains}/n)}{}$$
$$\text{Average Loss} = \frac{(\text{Total Losses}/n)}{}$$

can be used in calculating the average gain and average loss of the given stock. The average gain or loss used in the calculation is the average percentage gain or losses during a look-back period. The formula uses positive values for the average losses.

Here, n = number of days taken in the history of each stock.
Total Gains = Sum of gain value for the given stock in the past finite number of days.
Total Loss = Sum of loss value for the given stock in the past finite number of days.

4.4 CALCULATION OF RELATIVE STRENGTH INDEX (RSI) FOR THE STOCKS:
The Relative Strength Index (RSI) is displayed as an oscillator (a line graph that moves between two extremes) and can have a reading from 0 to 100. RSI compares bullish and bearish price momentum plotted against the graph of an asset's price. Calculation of RSI is an easy task for which it requires the previous data of the stock which was taken as the input. From the history data of the stock we can take the required parameters like Gain and Loss to find the average gain and

$$RSI_{\text{step one}} = 100 - \left[\frac{100}{1 + \frac{\text{Average gain}}{\text{Average loss}}}\right]$$

average loss from which we can calculate the RSI for the stock. The formula for calculating RSI is a two-step process and is as shown below:

$$RSI_{\text{step two}} = 100 - \left[\frac{100}{1 + \frac{\text{Previous average gain} \times 13 + \text{Current gain}}{\text{Average average loss} \times 13 + \text{Current loss}}}\right]$$

Once there are 14 periods of data available, the second part of

the RSI formula can be calculated. The second step of the calculation smooths the results.

SYMBOL	OPEN	HIGH	LOW	CLOSE	PREVCL	RSI
PGHH	9803	9879	9711.35	9784.95	9850	14.19285
ABBOTINDIA	7510	7546.65	7485.1	7504.5	7471.95	56.71672
TTKPRESTIG	7506.9	7506.9	7352	7454.9	7514.2	45.55404
MARUTI	7239	7309	7161.2	7234.5	7203.95	11.79704
GILLETTE	6499	6500	6449.95	6494.15	6484.95	46.73452
BAJAJFINSV	6419.95	6460	6357	6410.45	6383.3	30.47518
SANOFI	6200.35	6270	6101.25	6128.25	6234.1	11.37736
LAXMIMACH	5738	5738	5654.7	5708.4	5691.6	34.72284
SCHAEFFLER	5615.2	5692.95	5615.2	5666.9	5631.4	57.93935
TIDEWATER	5434.95	5445	5390	5401.25	5413.7	50.61399
BHARATRAS	5229.6	5290	5201.1	5278.45	5262.7	56.1609
IDFCBANK	4885	4925	4885	4925	4925	60
BAYERCROP	4219	4279.35	4180	4245.25	4214.1	32.14789
HDFCSENETF	3959	3959	3696	3726	3717.18	12.18064
ULTRACEMCO	3928	3928	3853	3914.55	3900.05	21.00706
EXCELCROP	3738	3738	3661.65	3674.5	3731.85	46.31197
HEG	3669	3690.05	3640.5	3653.6	3654.9	26.59864
OFSS	3606	3623.45	3551.35	3598.2	3594.65	34.86349
SUNCLAYLTD	3490	3514	3445	3446.2	3492.35	30.02059
ATUL	3448.2	3474.9	3423.2	3459.85	3455.75	84.70343
BLUEDART	3333	3374.85	3301	3348.85	3358.85	61.52934
ICRA	3165.95	3199	3165.95	3187.45	3150.25	51.16845
MAHSCOOTER	3165	3175.05	3133.6	3146.4	3183.8	62.56158
HNGSNGBEES	3153	3153	3100.01	3111	3154	28.57623
BRITANNIA	3137.95	3159.2	3105.55	3122.7	3135.9	66.06906
WENDT	3080.05	3174	3080	3100.6	3105.3	37.29533

Table – 4: Calculated RSI for all the Stocks

4.5 SELECTION OF BEST STOCKS USING CALCULATED RSI VALUES:
From the calculated RSI values for the selected stocks, we select only few best stocks to do the swing trades. Every stock which need to be selected has to follow a rule from the following two rules:

1. RSI value should be below 30 (Oversold)
2. RSI value should be above 70 (Overbought)

If the stock satisfies at least one in between the above mentioned rules, then it is eligible to be selected for the trade. Oversold condition is when the stock has reached its lowest bottom of its price over a period a period of time let's say 1 week, and it is the time for the stock to raise up to neutralize. Overbought condition of the stock is when the stock has reached its highest high of its price over a period of time let's say 1 week, and it has to go down to neutralize.

SYMBOL	OPEN	HIGH	LOW	CLOSE	PREVCLOSE	RSI
ACCELYA	944.90	964.95	940.10	944.15	948.25	74.721408
AEGISCHEM	206.95	211.70	204.25	208.40	206.85	97.385621
AHLWEST	296.00	305.65	294.10	302.40	294.05	78.400000
ALBERTDAVD	402.10	419.90	402.10	413.25	411.20	99.082569
ALKALI	53.95	54.75	53.30	54.75	53.80	90.909091
ALKEM	1970.00	1970.00	1918.10	1950.05	1962.40	73.333333
SYMBOL	OPEN	HIGH	LOW	CLOSE	PREVCLOSE	RSI
ABB	1314.9	1318.95	1295.60	1303.65	1308.95	8.385093
ADFFOODS	273.3	273.30	263.00	264.40	268.00	18.032787
ADVANIHOTR	63.8	64.90	62.05	63.40	63.00	27.607362
ALPHAGEO	480.0	480.00	461.35	465.40	468.45	14.611872

Table – 5: Sorted list of the stocks with Overbought and Oversold positions of RSI

In oversold condition, the RSI value reaches to 30 or even below, where the stock price reaches the oversold position and the stock price raises up. If these kind of stocks are identified at foremost that would be helpful for a trader to some profits out of it. At the position where the RSI is about to raise

up will be the best place for a trader to buy that stock to make money out of it. As we know that there will be some limitations for anything which was created on the earth, this method has some limitations. In this position where the RSI is about to go up or increase will help out the trader to buy the stock at the lower level of RSI i.e., at the lowest value of the stock price and sells at the higher price level where the RSI completely reaches the upper or touches the overbought position of the stock. The price of the stock may not raise completely and sometimes it may go down which will completely rely on the overall market trend. In overbought condition, the RSI value reaches to 70 or even above, where the stock price reaches the overbought position and the stock price decreases. If these kind of stocks

Figure – 2: Overbought and Oversold positions of RSI which helps to do Swing trade for a trader.

are identified before, then it will be very helpful for a trader to get out of the trade of that particular trade or even to short the stocks. In this position where the RSI is about to go down or decrease will help out the trader to short the stock at the higher level of RSI i.e., at the peak value of the stock price and buy at the bottom price level where the RSI completely reaches the bottom or touches the oversold position of the stock. As similar to overbought position of RSI this method has also some limitations where the price of the stock completely depends on the overall market trend. The above mentioned chart gives a complete overview of the stock to undergo a swing trade by a trader. This chart covers the whole overbought and oversold positions of the RSI values. The below chart unlike the candle chart is the RSI plot. Using the RSI plot a trader can easily identify the situation of the stock which was taken and may proceed to complete a swing trade where the stock will need some time (days) to change its trend and retreat back. During the trend creation and trend retrieval the trader can complete a successful trade with good amount of profit.

Table – 6: Example of Selected RSI Stocks

The above table is about the classified stocks into overbought and oversold stocks which help in the further steps. These stocks in this stage can also be used for the trade but to have a confirmed profit these need to pass the next test that helps to become more accurate.

4.6 PREDICTED OF THE RSI FOR THE SELECTED STOCKS USING LSTM:

| Previous Model	Our Model
1. Uses all the stocks for prediction. 2. Time consumption is comparatively more. 3. Predicts future trend for all the stocks and makes classifications.	1. Uses only specific stocks. 2. Time consumption is less. 3. Predicts trends for selected stocks and classify them with good accuracy.
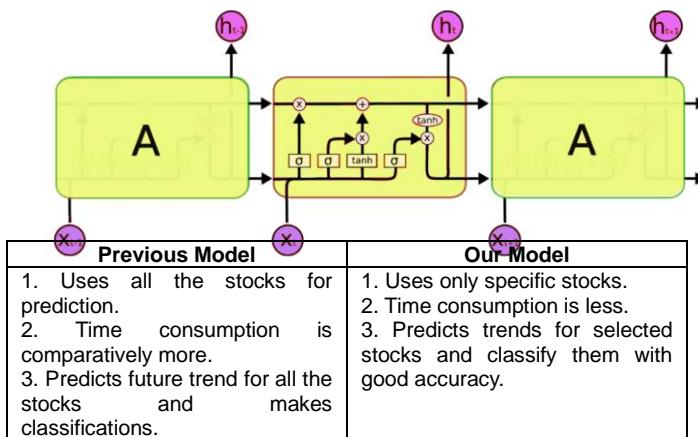
Figure – 3: LSTM Architecture

The above mentioned Figure – 3 is the model architecture of the LSTM. In this phase, Prediction of stock trend will be done using LSTM neural network model (ML). The model architecture is as shown in the above figure, which has 3 gates: Input gate, Forget gate and Output gate. LSTM model is trained by the stock data for the selected stocks from the above phase. Steps involved in trained of the LSTM model are:

    a. Input given is the time series Stock data for the above selected stocks.
    b. Training of LSTM using the given data.
    c. Produce the output data.
    d. Training of LSTM using the produced output data along with given stock data.
    e. Producing the final output.

After producing the final output from the LSTM model, the data will undergo a conditioned statement where it will sort out the data by following condition:

Condition:
    if (Stock RSI Increases Gradually):
        do Buying
    else if (Stock RSI Decreases Gradually):
        do Shorting

By producing the final stocks after going through the above mentioned conditions, then stocks are ready for the swing trades to trade and get the good amount of profit.
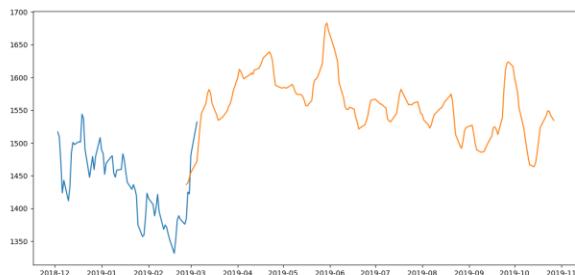

Figure – 4: Predicted Stock Trend using LSTM Model.

The above mentioned Figure – 4 is an example which helps the trader to get the idea about the future trend of the stock. It was generated by the LSTM neural network model which was trained with the previous stock data of the particular stock from the list of stocks provided by the previous stage. The blue line is the actual trend of the stock and the orange line is the predicted trend of the stock for the next few months. This helps a swing trader or a long term trader to get more accurate result about the stock trend which helps them to get more amount of profit. By selecting the specific stack of stocks i.e., training the machine learning model and predicting the stocks future and classifying them to trade makes the process to be executed in less amount of time which can be considered as an improvement over the previous methods that was mentioned in the paper by Sang et al. [6]. So, our paper can make a unique quality in reducing the time consumption by selecting the specific stocks.

5 CONCLUSION
The research paper will give a keen insight of the usage of combination of RSI with LSTM in the stock market. Using the above mentioned method a trader can select few best stocks from a large number of stocks. LSTM model used in the paper produced 92% accuracy. It also tells about the swing trade, overbought and oversold positions of the stocks. With the help of above mentioned algorithm for the selection of stocks a trader will get more profits with less complexity of the trades.

6 FUTURE WORK
We are working on enhancement of the above mentioned algorithm using a Machine Learning algorithm that helps to find the trend of the RSI and predict the future RSI value along with its trend, where the machine learning model needs to be trained with the time series data of each and every stock history data to produce the predictions of each stock price for the next few days along with the usage of other technical indicators like MACD, Bollinger bands and many more.

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