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Trading Bot

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Abstract : Algorithmic trading make use of algorithms that carry out trades in accordance with predetermined rules and trends. The trade can provide income at a speed and frequency that are unreasonably high. Timing, value, quantity, or any other mathematical model are all factors that influence the stated sets of trading rules that are communicated to the software. Algorithmic trading increases market liquidity and boosts trading success by reducing the impact of human emotions, in addition to offering the trader an appealing investment. By creating an algorithmic trading bot that will automatically trade user strategies along with its own algorithms for day-to-day trading based on various market conditions and user approach, and throughout the course of the day invest and trade with continuous modification to ensure the best trading result, our project seeks to advance this resolution in the markets of the future.

IndexTerms **- Co Algorithmic Trading, Finance, RSI (Relative Strength Index, Moving Average).**

I. INTRODUCTION

The execution of orders using automated pre-modified trading rules that account for variables like time, cost, and volume is known as algorithmic trading. This type of trading aims to exploit the computing power and speed of PCs in comparison to human brokers. Only one out of every five investors is successful. These odds are increased by algorithmic trading thanks to better result and execute. A trading bot's USP is that it makes traders' jobs easier and enables the trader to generate quick money with the least amount of work. A "prerequisite" for surviving in the financial markets of the future is now algorithmic trading. According to market studies, the size of the worldwide trading market is predicted to increase from approx. $11.1 billion in 2019 to $18.8 billion in 2024. Algorithmic trading's future is thus still to come. Several benefits of algorithmic trading 3 Back-testing, which enables traders to evaluate a trading idea. Necessarily the project is featured by not using “Simple Yet Efficient Bot” for using “Common Man”

1. Fast and reduce cost trading.
2. Increased accuracy and variety in trading.

Between 2018 and 2026, there is anticipated to be a major increase in the market for algorithmic trading.

By offering a practical and efficient solution to the problems caused by manual trading, such as: Trades are conducted at the best prices, our initiative seeks to advance this revolution in the markets of the future.

- The status of the trade request is accurate and timely (there is a high possibility of execution at the ideal levels).
- Transactions are swiftly and efficiently arranged to avoid material value fluctuations.
- Lower exchange fees.
- Parallel automated checks using various market conditions.
- Less chance of making human errors when trading.
- To determine whether algorithmic trading is appropriate for trading, it can be back tested using historical and real-time data.
- Lessened the likelihood that human traders may make mistakes as a result of emotional and psychological elements.

II. LITRETURE REVIEW

Relative Strength Index is a widely used technical indicator in trading that helps in determining assets that is oversold or overbought. In this literature report, we will review some of the

existing literature on the use of trading bots based on the RSI indicator.

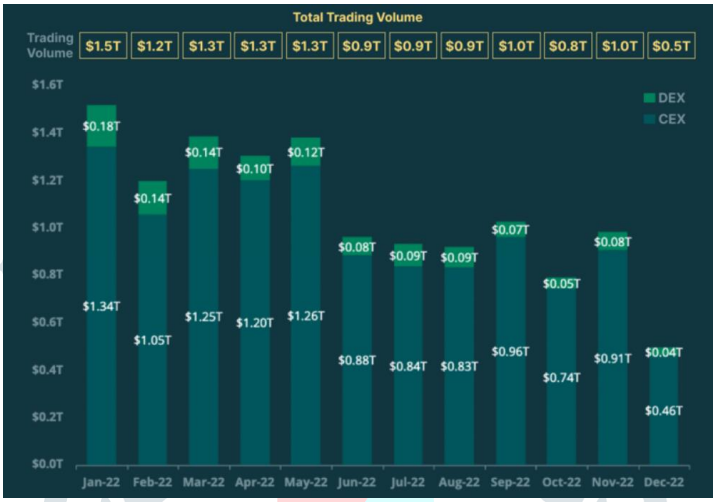
1. In their 2019 paper, "Using Relative Strength Index (RSI) in Trading Strategies," Yulia A. Vasilyeva, Anton A. Tuzhilin, and Anna A. Polyakova: The efficiency of employing the RSI indicator in trading methods based on different timeframes is assessed in this research. According to the study, RSI-based trading strategies are more profitable in bull markets and are better suited for short-term trading. The method, according to the authors, is less successful in a bear market.

2. S. Sivakumar and V. Jagadeesan's "Trading Methods Based on the Relative Strength Index Indicator" (2020): In order to

limit losses during market downturns, the trading method presented in this paper is based on the RSI indicator. The authors suggested a trading algorithm that uses stop-loss orders to reduce losses and used the RSI indicator to identify the overbought and oversold levels.

3. Daehwan Kim and Taein Kim's "A Machine Learning Approach to Relative Strength Index Trading" (2020): In order to predict the direction of the market, this research suggests a machine learning-based strategy for RSI trading. The authors' algorithm outperformed the conventional RSI-based trading method when tested on the S&P 500 index.

4. Relative Strength Index Indicator-Based Trading Bot Design and Implementation by Yiming Li, Bing Li, and Chunxiao Li (2021): The design and deployment of a trading bot based on the RSI indicator are presented in this study. The overbought and oversold levels were identified by the authors using the RSI indicator, and the bot was programmed to make trades based on these levels. The writers used historical data to evaluate their bot, and they discovered that it regularly earned profits over time.



SR.NO	PAPER TITLE	AUTHOR	Proposed Methodology	Limitation	Future Scope
1	Using Relative Strength Index (RSI) in Trading Strategies	Anna A. Polyakova, Yulia A. Vasilyeva, Anton A. Tuzhilin	-Effectiveness for short terms.	Strategy was less effective.	Get more efficient for both short and long term,
2	Trading Strategies Based on the Relative Strength Index (RSI) Indicator	S. Sivakumar, V. Jagadeesan	-Minimize the loss during market down.	Use stop-loss.	Without Stop-loss you can minimize loss.
3	A Machine Learning Approach to Relative Strength Index (RSI) Trading	Daehwan Kim and Taein Kim	-Machine learning	Outperformed caused oversold and overbought levels.	Get proper levels for oversold and overbought.
4	Design and Implementation of a Trading Bot Based on Relative Strength Index (RSI) Indicator	Yiming Li, Bing Li & Chunxiao Li	-Design and implementations	Only find symbols that provide profit consistently.	Design & make suitable for every symbols.

Table: Literature Review for existing product

2.1 what is output of using RSI indicator?

The Relative Strength Index (RSI) indicator produces a numerical value between 0 and 100 that represents the strength of the price movement of an asset. The average gains and losses of an asset over a given time period, usually 14 days, are used as the basis for the RSI indicator.

The asset is generally thought to be overbought if the RSI value is above 70, which implies that a price correction or a trend reversal to the downside may be in order. The asset may be due for a price correction or an upward trend reversal, however, if the RSI reading is below 30, which is often thought to suggest that it is oversold.

The RSI indicator is a technical tool that traders can use to construct trading strategies and decide whether to buy or sell a security. It is crucial to remember that the RSI indicator is not a foolproof predictor of future price movements, therefore traders should always use caution and conduct their own research before to engaging in any trading activity.

2.2 what is output of using MA indicator?

A line that depicts the average price of an item over a given time period is the result of utilising the Moving Average (MA) indicator. The MA indicator is calculated by multiplying the total number of data points by the number of prices throughout the selected time period.

To spot trends in an asset's price, use the MA indicator. In general, it is thought that if the price is above the MA line, it is a bullish indication suggesting an uptrend, and if it is below the MA line, it is a negative signal indicating a down trend. The MA indicator is frequently used by traders in conjunction with other technical indicators, chart patterns, and trading systems to determine whether to buy or sell: Traders might, for instance, employ a crossover strategy in which they purchase when the price crosses above the MA line and sell when it crosses below the MA line.

The MA indicator is a lagging indicator, which means that it is based on historical price data and may not always be reliable at forecasting future price movements. This is a crucial point to keep in mind. To make wise trading decisions, traders should always conduct their own analysis and combine the MA indicator with other indicators and chart patterns.

2.3 What if we combine RSI and MA and what outcomes it gives?

The accuracy of trading signals may increase if the Relative Strength Index (RSI) and Moving Average (MA) indicators are combined to give traders a more thorough study of an asset's price movements.

Using the RSI to spot overbought or oversold levels and the MA to validate the trend's direction is a typical technique to combine both indicators. For instance, before opening a long position, a trader can wait for the price to cross above the MA line to confirm the start of an uptrend if the RSI shows that an asset is oversold (RSI value below 30). If, however, the RSI shows that an asset is

overbought (RSI value is greater than 70), a trader may wait for the price to cross below the A downtrend must first be confirmed by the MA line before a short position can be taken.

The price crossing above or below the MA line is used as a signal to buy or sell, respectively, and the RSI is utilised as a confirmation of the trend in a crossover strategy, which is another technique to combine both indicators. A trader may open a long position, for instance, if the price crosses above the MA line and the RSI is also showing bullish conditions (RSI value above 50).

Combining the RSI and MA indicators may allow traders to weed out erroneous signals and spot more reliable trading chances. However it's crucial to remember that no trading technique will ensure gains, so investors should always use care and conduct their own research before making any trading decisions.

III. DATASET

Binance API and Binance Documentation is used to fetch past data and put it into a dataset. The dataset contains Date, Open Price, High Price , Low Price , Close Price and Volume traded for that particular Symbol day wise.

A. Annotation Description

As previously indicated, the dataset consists of several columns. Only the Close Price for the specific symbol is a necessary column for our prediction. Our ability to trade will be aided by the Close Prices, RSI, and Moving Average indicators. Due to the predictive capability of our bot, this will be connected with financial plans to improve performance with higher precision.

IV. PROPOSED METHODOLOGY

The diagram of our proposed solution. There are two types of roles: Trader and Bot. A bot can be used by the trader to set up a day trading plan, manage their account, access trade orders, and examine market information. The Bot will validate trades, execute trading orders, provide notifications, and have access to user wallets in line with user and market statistics.
A few distinctive characteristics are listed at the top of the diagram..In the diagram, a few unique traits are listed at the top.

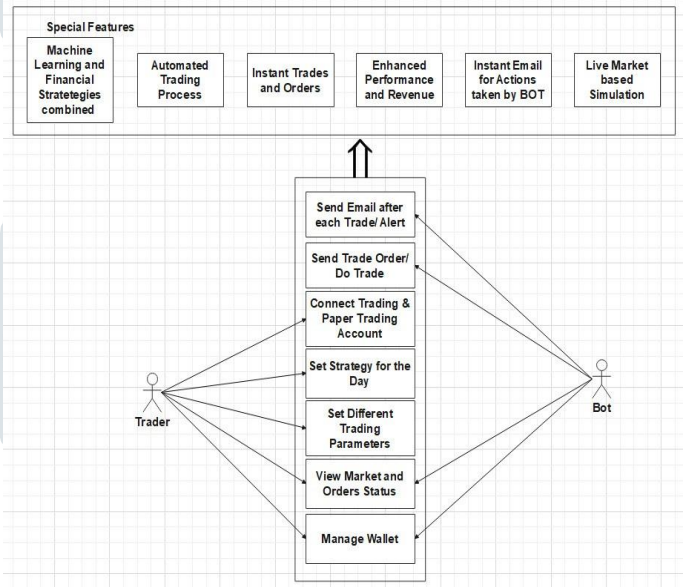


Figure 8: Architectural Diagram of Trading Bot

A. Data Pre-processing

Data pre-preprocessing is applied to the dataset to allow Intraday fluctuations to be fed into the indicator.
All columns but Closing price have been deleted.
a. By trailing the data by one day and assuming that we traded at the close of the previous day, we may determine the actual trading signal. We add a 14-day delay.
b. After that, we separate the required dataframe columns.
c. The dataset is split into the data at [0:33] (inputs) and the remaining data (Y) (outputs)

Table 3: Moving Average Evaluation

B. Splitting dataset into Test and Train dataset

Training and Testing portions of the dataset are split 70:30. X train, X test for inputs and Y train, Y test for outputs make up the new set of four variables.

C. Predicting the Results

We use the model that was calibrated using the values from the training set to predict the outcomes of the test set using the RSI-MA function, and we label the outcome as 'Y predicted.

V. EVALUATION

RSI (Relative Strength Index) –

Evaluation Metrics –

1. RSI formula–

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

2.Condition of RSI –

The RSI indicator normally crosses the 30 level on the RSI chart to suggest a positive signal and the 70 level to indicate a negative signal. In other words, it may be assumed that RSI values of 70 or higher indicate that an asset is beginning to become overbought or overvalued.

3. Using the mean squared logarithmic error approach, the expected value of quadratic error or loss is calculated.

VI. RESULT

1. Backtesting **Moving Average Crossover** strategy –

Duration	Strike Rate	Profit Earned
1 year	77.78%	$ 820.8
10 years	53.85%	$ 1993.43

Table 3 shows the Back Testing results against Strike Rate and Profit Earned for 1-year and 10-year duration.

The Fig shows the plotted graph of Moving AverageStrategy for 1-year and 10-year duration depicting the behaviour of bot against actual trade movement.

1 YEAR CHART

10 Years Chart

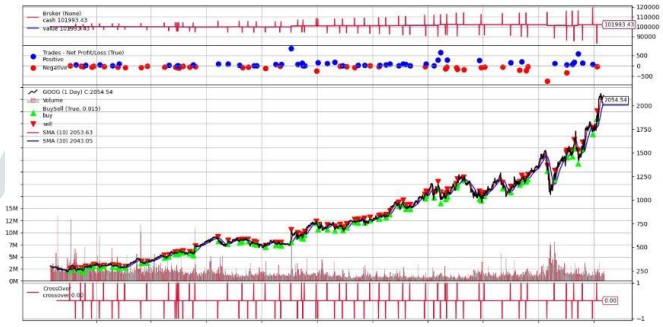


Figure 17: Moving Average Back testing

2. Back-testing RSI strategy-

Table 4 shows the Back Testing of RSI strategy results of Strike Rate and Profit Earned for 1-year and 10-year duration.

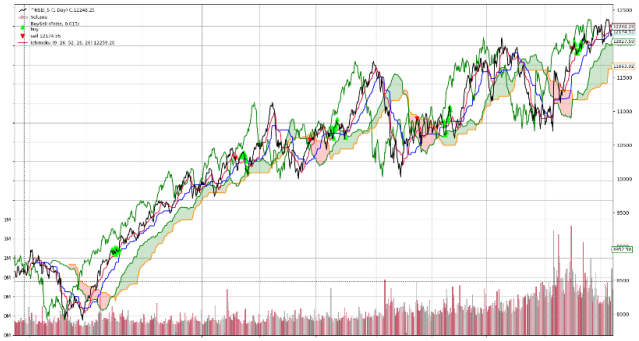
Table 4: RSI Evaluation

Duration	Strike Rate	Profit Earned
1 year	79.71%	$ 840.00
10 years	59.88%	$ 2216.64

SPY				
RSI(14)	5 days	10 days	15 days	20 days
>80	-0.19%	-1.98%	-3.16%	-3.75%
>70	-0.24%	-0.58%	-0.70%	-0.78%
>50	-0.04%	-0.08%	-0.14%	-0.22%
all	0.00%	0.00%	0.00%	0.00%
<50	0.10%	0.17%	0.33%	0.51%
<30	1.17%	-0.18%	-0.40%	0.31%
<20	2.99%	1.51%	-0.35%	0.65%

1 years Chart

10 years Chart



VII. CONCLUSION

Algorithmic trading bots are a groundbreaking piece of technology for the financial markets and economy of the future in addition to offering Security, Cost, and Speed. Algorithmic Trading Bot makes it simpler for both new and experienced traders to get successful results with the least amount of work, time, and loss. Future trading will require the integration of financial knowledge and machine learning, which improves performance and revenue.

VIII. ACKNOWLEDGMENTS

We want to thank our college, Parul Institute of Technology, our mentor, Prof. Urvashi Rakholiya Ma'am, and our project coordinator, Prof. Mohit Rathod, for giving us the chance to work in this project and for giving us with the support and direction we needed to make it a success. We also want to express our respect to our coworkers for their support, enthusiasm, and contributions to this effort. Without their work, this project wouldn't be a success.

IX. REFRENCES

1.TradingView: https://www.tradingview.com/wiki/Relative_Strength_Index_(RSI)

2.Investopedia: https://www.investopedia.com/terms/r/rsi.asp

3.J. Welles Wilder Jr. - The creator of the RSI, wrote about the indicator in his book, ”NewConcepts in Technical Trading Systems.”

4.Andrew Cardwell is a renowned RSI analyst who has written numerous books and articles on the topic. The Relative Strength Index Advantage is one of his books.

5.StockCharts.com:

https://school.stockcharts.com/doku.php?id=technical indicators:moving averages6.https://www.binance.com/en/markets

7. Investopedia: https://www.investopedia.com/terms/m/movingaverage.asp

8. J. Welles Wilder Jr. - The creator of many technical indicators including the MA, wrote aboutit in his book, ”New Concepts in Technical Trading Systems.”

9. John F. Carter's 2005 book, "Mastering the Trade: Proven Strategies for Profiting from Intraday and Swing Trading Setups,"

10.”The Moving Average Convergence Divergence Trading Method” by Gerald Appel - Thisbook, published in 1993

11.John J. Murphy - A leading technical analyst, has written extensively about moving averagesin his book, ”Technical Analysis of the Financial Markets.”

12.StockChart.com:

https://school.stockcharts.com/doku.php?id=technical indicators:relative strength index rsi"RSI: The Complete Guide" by John Hayden - This book, published in 2018, provides a detailed explanation of the RSI indicator, including its calculation, interpretation, and use in trading strategies.

13."The RSI PRO: The Core Principles" by Corey Rosenbloom - This book, published in 201215.https://binance-docs.github.io/apidocs/spot/en/

16. John L. Person's book, "A Comprehensive Guide to Technical Trading Techniques," was released in 2004.

17. Constance Brown's book, "Technical Analysis for the Trading Professional," was first released in 1999.

18. Technical Analysis Explained: The Successful Investor's Guide to Seeing Investment Patterns and Turning Points was published by Martin J. Pring in 2002.