Cryptocurrency Trading Bot

***Abstract*—This paper tries to minimize the difficulties and ease the process while generating a profit in the Cryptocurrency based share market, using a trading bot. This helps to minimize human efforts, and improve the accuracy of the buying and selling process of a share, as well as the computation time. To this extent, Cryptocurrency Trading Bot was proposed in this paper to achieve the said requirements. An attempt was made to Automate the Crypto Trading Strategies on Binance and Bitmex using Python.**

Index Terms*—*Relative Strength Index (RSI), Moving Average Convergence/Divergence (MACD), Exponential Moving Average (EMA), Simple Moving Average (SMA)

I. Introduction

In the rapidly evolving realm of technology, a bot is a brand-new agent. As machine learning and artificial intelligence advance, there is growing interest in bots. A bot is an expansion of human interface technologies like phone and social media. Similar to digital or virtual currency, cryptocurrencies are a recent development designed to serve as a medium of exchange. [1]A protocol for a peer-to-peer electronic cash system that became the foundation for distributed ledgers called block chains. Block chain functions something like a global ledger or spreadsheet. It operates on computers provided by volunteers all around the world and without a central database. Because a block chain exists on the network rather than within an unified system, anybody may examine it at any moment. A block chain is encrypted and it uses public and private keys to maintain some level of virtual security and is encrypted. With a block chain, one may securely transfer money to some other individual without navigating through a financial institution or bank. Block chain technology refers to several industries that are utilizing distributed ledgers, such as the financial services sector.

A bot is one method that might be used to swiftly and automatically retrieve information. Crypto bots are software programs created to execute trades on a trader's behalf, automating and enhancing trading efficiency. The latest trend in investment and money management over the past several years has been cryptocurrencies. A new cryptocurrency market has begun to compete in the area once allocated for trading stocks and other traditional market securities, with Bitcoin staking claiming to be the most comprehensive form of wealth storage. There are currently thousands of different cryptocurrencies that may be traded. As a result of the high level of volatility, it is simple to make and lose a lot of money. Generally, one of the biggest obstacles to establishing an excellent trading history is human emotion. Often, it is our greed that triumphs in front of us, causing us to lose money and delay taking profits when we need to.[2] Sometimes even the market behaves irrationally and deviates from predicted trends. This paper includes important concepts whilst creating a real trading application, from API connections to trade management.

II. Objective

The primary goal of the automated trading strategy is essentially to continuously watch the prices of the financial markets, and transactions will be automatically completed if certain criteria are satisfied.[3] The goal is to execute trades more by making use of specific advantages quickly and efficiently, technical market developments. Trading automatically enables you to:

- Adjust your strategy to accommodate your timeline and have transactions executed automatically day or night.
- By planned action, you may reduce the impact of your feelings and instincts.
- Explore new possibilities and evaluate trends using a wide range of indicators.
- Perform several real-time deals at once and eliminate away with manual execution

III. Literature Survey

Two of the most well-known cryptocurrency exchanges in the world are Binance and Bitmex. [4] They provide amazing automation opportunities and are excellent for novices. The knowledge you would gain may then be applied to other exchanges. Initially, the testing environments that both Binance and Bitmex offer can be used, including their API in order to test our strategies.

Cryptocurrency marketplaces enable you to run your bot around the clock, which is more convenient and efficient. Research has been conducted on this topic in considerable amounts.

A. Trading Bot (2019)

[5] It makes use of the Coinbase Pro API and python's Technical analysis libraries. The trading strategy involves the use of Bollinger Bands. The trading bot makes multiple buys and sell calls based on the information that it gets from the Bollinger Bands, and tries to maximize profit while limiting risks. It is based on RSI. As a momentum indicator, the Relative Strength Index is used to gauge the market's momentum. It shows you in what direction the market is heading. This statistic compares the number of times the price closed in an upward trend versus a downward trend.From this information, the Relative Strength Index is assigned a score from 0-100.

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B. Automated Cryptocurrency Trading Bot Implementing DRL (2021)

[3] This research proposes a new automated cryptocurrency trading system integrated with DRL. This research has perfectly demonstrated its capability to resolve the stated problem statement – overcoming human hindrance and bridging the gap between human and automated trading. The goal of presenting the concept and use of cryptocurrencies to all audiences and utilizing the power of machine learning to earn profits has been accomplished. Different training parameters have not been explored since the time constraint arises from hardware constraints. In the future, this work hopes to explore different architecture to induce a comparison, thus reaching a consensus on the best-performing architecture. Furthermore, the input data features can be further improved, and different technical indicators can be tested. Correlation analysis such as the Pearson correlation coefficient can be further conducted to drop correlated features to achieve optimal noise reduction (Benesty et al., 2009). To effectively address each cryptocurrency's market behavior, models should also be trained on each cryptocurrency's historical data to attain even greater accuracy and adaptability.

C. Multi-Timeframe Algorithmic Trading Bots Using Thick Data Heuristics with Deep Reinforcement Learning (2022)

[2] In order to successfully learn trading execution timing policies, this article introduces an enhanced Artificial Intelligence (AI) algorithmic trading approach that combines Thick Data Heuristic (TDH) and Deep Reinforcement Learning (DRL). In this study, we explore how to combine the augmented AI human trader's intuition and heuristics with DRL techniques to provide more focused drivers for trading order execution timing. The objective of this study is to find an AI solution to the sequential decision-making problem for successful day and swing trading order timing executions. By giving trading bots cognitive intelligence and sensible heuristics, traders, including automatic traders, will gain insight into the day-to-day swing trading time frame indicators and be able to make more informed trading decisions. Nevertheless, it was determined that human heuristics and intuition cannot be entirely. If complex models are not used properly, they may overfit or reveal misleading correlations and patterns. Financial model is crucial to test a wide range of model parameters and calibrate the model for the right market circumstances.

D. Proposition of a Trading Bot for Cryptocurrency Market(2022)

[6] In this study, trading decisions are made in two different ways: using an algorithmic learning model that forecasts the price and then acts in accordance with it. In the end, the trading bot did turn a profit, although a little one. To boost the profit, a few modifications to this concept were necessary. For instance, several new trades may be established. The parameters of this trading bot are configured to sell any time it earns a 1 percent profit. Although this is a very little profit, over time it will add up and the portfolio will grow.

E. Algorithmic Trading Bot (2021)

Algorithms that follow a trend and a predetermined set of rules are used in algorithmic trading to execute trades. The trade can provide income at an unnaturally high speed and frequency. The software receives described sets of trading rules that are dependent on timing, value, quantity, or any mathematical model. In addition to providing the trader with profitable opportunities, algorithmic trading eliminates the impact of human emotions on trading, making the market more liquid and trading more accurate.

IV. Methodology

A. Employing APIs to interact with different crypto exchanges, and execute trades on them

You may interact automatically with a crypto trading platform through an API, which is a software interface. A crypto trading bot initially analyses the data using machine learning algorithms and discovers prospective transactions fitting its pre-set criteria utilizing Application Programming Interface (API) keys to access the trader's account. By writing the appropriate code, you may easily import a crypto trading platform into your account via an exchange API.You can buy and sell assets, access real-time and historical market data, and execute more complicated trading methods from your terminal by interacting with an API.

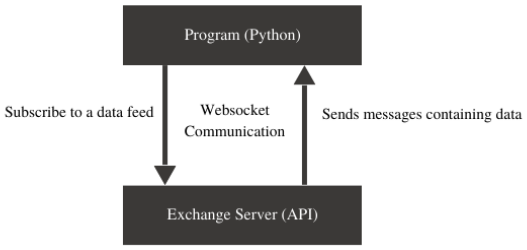

Fig. 1. The WebSocket API makes it possible to open a two-way interactive communication session between the user's browser and a server

B. Churn data from exchanges

What we do is to use the websocket feed to keep building the candlesticks using live data. When you see a Candlestick on a chart it is based on trade data. So every time a trade occurs it can change the high or low of a candle. Traders analyze candlestick charts to predict potential price movement based on historical trends. While trading, candlesticks are helpful since they provide four price points i.e. open, close, high, and low (OHLC) [7]which is a type of chart typically used to illustrate movements in the price of a financial instrument over the specified time period. In the open high-low strategy, the buying signal is generated when a stock has the same value for both, open and low. Similarly, the selling signal is generated when the stock has the same signal for both - open and high. After we have parsed the trade coming in from the websocket we need to know whether this trade will have an influence on the current candle, like if it's for example the new high of the

candle or maybe this trade is the first trade of a new candle so that will be the candle open price. So every time a trade occurs it can change the high or low of a candle. We have

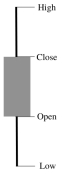

Fig. 2. a Candle Stick is used to represent Open, close, high, and low price points

Fig. 3. combination of candle sticks forming a graph based on time

Candlesticks data that updates, thanks to the WebSocket data, we can create a method that will check the signal, that is to say, indicate whether we should enter a long or short trade or do nothing. You'll go long when you believe that the market price will rise and go short if you think it'll fall.

C. Generate trading signals

Buy Thresholds (If the Bot is in SELL State) DIP Threshold - Buys the asset if its price decreased by more than the threshold. The idea of this is to follow the "buy low, sell high" strategy, where you attempt to buy an asset when it is undervalued, expecting its value to rise so you can sell. Upward Trend Threshold: Buys the asset if its price increases by more than the threshold. This goes against the "buy low, sell high" philosophy, but aims to identify when the price is going up and we don't want to miss an opportunity to buy before it goes even higher. Sell Thresholds (If the Bot is in BUY State) Profit Threshold - Sells the asset if its price has increased above the threshold since we bought it. This is how we profit. We sell at a higher price than we bought. Stop Loss Threshold - Ideally, we would only want our bot to sell when it makes a profit. However, maybe the market is just going down significantly and we want to get out before it's too late and then buy at a lower price. Therefore, this threshold is used to sell at a loss, but with the goal of stopping a bigger loss from happening.

D. Involve Strategies and then execute a trade

There are basically two strategies that have been implemented. Breakout and Technical. The breakout strategy is simply a method to check signals and interpret whether we should enter a long or short sell trade. It only needs the candles and no need to compute an indicator. Whereas technical

Fig. 4. Upward Trend Threshold and DIP Threshold

Fig. 5. Profit Threshold and Stop Loss Threshold

strategy involves two methods namely Relative Strength Index (RSI) and Moving Average Convergence/Divergence (MACD). Technical analysis uses the relative strength index (RSI), a momentum indicator. To assess whether a security's price is overpriced or undervalued, RSI evaluates the speed and amplitude of recent price fluctuations.[8] The relative strength index, which measures momentum, contrasts a security's strength on days when prices rise to its strength on days when prices fall. Trading professionals can predict how an asset will perform by relating the outcome of this comparison to price movement.

$$RSIstepone = 100 - \frac{100}{1 + \frac{Averagegain}{Averageloss}} \quad (1)$$

The RSI indicator may be plotted alongside a price chart for an item after it has been calculated, as seen below. [8] When the quantity and magnitude of up days climb, the RSI will rise as well. When the quantity and size of down days grow, it will decrease. The RSI indicator can remain in the overbought range when the stock is in an uptrend, as shown in the chart

Fig. 6. RSI plot on a price chart

above. When the stock is in a downturn, the indicator could hang around in an oversold area for a while.

The other method that is involved is MACD, which is a momentum oscillator that is mostly employed for trend trading. [9]Being an oscillator, it is sometimes employed to identify overbought or oversold positions. It shows two lines that fluctuate without boundaries on the graph. Clearly said, a

Fig. 7. MACD plot on a price chart

moving average is a line that depicts the average value of the prior data over a certain time period. Simple moving averages, also known as SMAs, and exponential moving averages, popularly known as EMAs, are the two categories into which it is separated. SMA gives all of the prior data equal weights.[9] The most current data values are given more weight by the EMA. Two exponential moving averages that make up the main MACD line are subtracted to get the EMA. The signal line is the second EMA that is calculated using this line. A histogram is produced on the MACD chart based on the difference between the MACD and signal lines in addition to the MACD and signal lines.

E. Advantages of Trading Bot

1) Trade more efficiently and systematically.
2) Takes the emotion out of trading as all the trades are executed based on predetermined rules set by you.
3) It can be multiple markets and exchanges at the same time for price discrepancies.
4) Saves you a lot of time and energy.

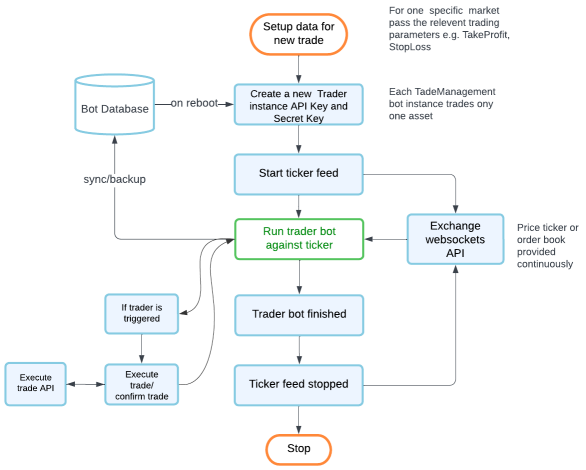

Fig. 8. Trader - A Trade Management Bot setup

5) Analyze data more efficiently to identify patterns to indicate future market conditions.[10]

V. Results and Discussions

Fig. 9. Overview

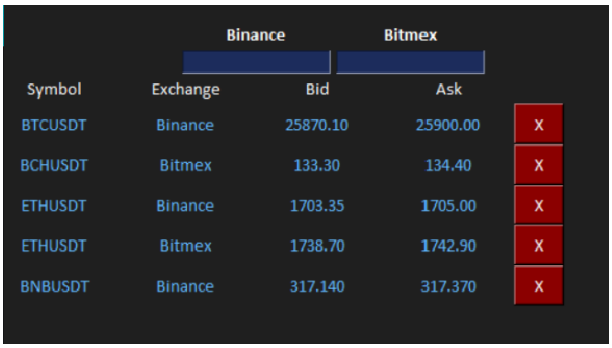

Fig. 10. Section I: Displaying the live Market Data

This section allows us to choose the bitcoin we wish to study about from either Bitmex or Binance. We can then compare its current price in both the platforms and buy the bitcoin according to our choice and eventually helps in making decisions. It contains four columns i.e. Symbol, Exchange, Bid and Ask. The column Symbol is basically represents the

symbol of the Bitcoin we will be adding. Exchange column contains the name of the platform, either Bitmex or Binance. The bid amount is the maximum price a buyer will pay to purchase a fixed number of shares of stock at any given time. While Ask is the lowest price at which a seller will sell the stock. The bid price will almost always be lower than the ask (offer) price.

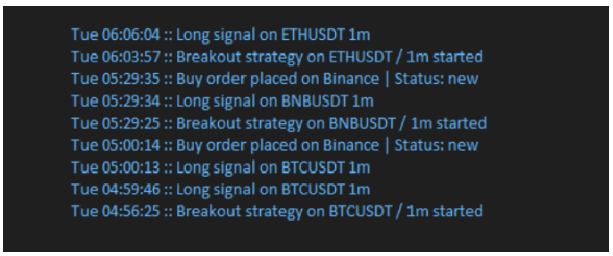

Fig. 11. Section II: Display updates to the user

This section basically gives the updates to the user by displaying the information about which the strategy has been used and on which Bitcoin, the day the order has been place and other updates like, BUY or SELL order, Long or Short Signal.

Fig. 12. Section III: Trading Strategy System

This section asks us to choose either of the two strategies, Technical or Breakout. Both strategies have been mentioned above. Then it will expect us to fill the other column details like Contract, Time frame. Contract is again the bitcoin we are using and the time frame is the time in which a candle stick will be generated. It then asks us to add the percentage value for Balance, TP i.e. Take Profit, SL i.e. Stop loss and Parameters. If the users choose the breakout strategy then they need to specify the minimum volume for it. While on choosing the Technical strategy they need to fill the values for RSI periods, MACD Fast Length, MACD slow Length and MACD Signal Length. The MACD is calculated by subtracting the 26-day exponential moving average (EMA), known as the slow length, from the the 12-day EMA, known as the fast length. The indicator then uses a 9-day EMA that is plotted as a signal indicator on the MACD. While the average time period we use for the RSI is the 14 period average.

This section displays about the Time (Month, date and time), Symbol of the Bitcoin, Exchange platform, Strategy (breakout or Technical), quantity, Status if its open or close, and PnL if its providing us the profit or loss.

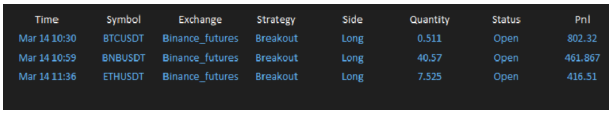

Fig. 13. Section IV: Follow orders, PnL, Order Status

VI. CONCLUSIONS

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. This Trade Bot makes it simpler for both novice 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.

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