

EMBOT: STOCK PREDICTION, CRYPTO PREDICTION AND ROBOT TRADING SYSTEM USING ML AND RPA

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Abstract — Because of the clear financial advantages, stock and cryptocurrency predictions have long drawn investors interested in stock exchanges and share markets. It is a significant area of study for finance as well. The ability to accurately predict stock market returns depends on a variety of variables, including corporate financial health and national policy. These days, a variety of factors, including corporate news, political events, social and economic situations, and natural calamities, have an impact on stock prices. There have been numerous research done to anticipate stock index values and daily direction of movement. For projecting the price of stocks in the future, numerous models have been devised, but each has flaws of its own. Financial firms have also used cutting-edge intelligent methods such as expert systems, neural networks, and pure mathematical models. Through a period of time, we compared the predicted values with the actual values in order to examine the prediction's accuracy.

Keywords—rpa, investing, automation, profit, robot, machine learning, stock, crypto

I. INTRODUCTION

In financial institutions, the prediction of stock market and cryptocurrency value returns is a crucial and challenging problem. Stock price forecasting has always been difficult to do. It has been noted that the stock prices of any firm depend not only on its financial standing but also on the socioeconomic environment of the nation. It is no longer directly related to the growth of the local or national economy. As a result, stock price prediction is now considerably harder than it was before. These days, a variety of factors, such as corporate news, political developments, natural disasters, etc., have an impact on stock prices. One of the most crucial topics to be looked into in academic and financial study is stock price prediction. There are numerous models available for predicting stock market prices. If we want to invest money in the stock market, we need to know if stock prices will rise or fall during the next few days. To predict the nature of the stock market, a number of computational approaches must be integrated [1]. Traditional capital market theory has altered throughout time, and different approaches to financial analysis have developed. For many years, there has been extensive research into predicting stock prices and the values of cryptocurrencies.

Cryptocurrency is a term used to describe digital or virtual money that is encrypted, making it nearly hard to counterfeit or double spend. Based on blockchain technology, which is a

distributed ledger maintained by a dispersed network of computers, many cryptocurrencies are decentralized networks. The fact that cryptocurrencies are often not issued by any central authority makes them potentially impervious to intervention from or manipulation by governments [2-3].

Consequently, our project will essentially forecast market mood. Users who have purchased our product will designate a robot to make trading investments. The robots will research the stock market situation and make investments depending on the potential profit margins. The robot won't invest in a project if the profit margin is too low or if that particular stock is not profitable. reducing anxiety among users about whether or not the stock they invested in is losing money. They only need to invest in our goods while they relax to receive the profits that the robot assigns.

II. SOFTWARE REQUIREMENTS SPECIFICATION

A. Overall Description

In financial organizations, stock market return forecasting is a crucial and complicated topic. Stock price forecasting has always been difficult to do. It has been noted that the stock prices of any firm depend not only on its financial standing but also on the socioeconomic environment of the nation. It is no longer directly related to the growth of the local or national economy. As a result, stock price prediction is now considerably harder than it was before. These days, a variety of factors, such as corporate news, political developments, natural disasters, etc., have an impact on stock prices. One of the most crucial topics for academic and financial research is stock price prediction[4-5].

The stock values have changed drastically over a short period of time as a result of the rapid data processing of these occurrences made possible by advancements in technology and communication networks. Numerous research were conducted to forecast stock index values as well as the direction of the index's daily movement. There are numerous models available for predicting stock market prices. If we want to invest money in the stock market, we need to know if stock prices will rise or fall during the next few days. To predict the nature of the stock market, a number of computational approaches must be integrated. Traditional capital market theory has altered throughout time, and different approaches to financial analysis have developed[6-7].

Many financial trading systems have also incorporated cutting-edge intelligent methods, such as neural networks, expert systems, and pure mathematical models, for stock prediction. Most academics have ultimately arrived at diverse approaches for employing artificial neural networks to forecast future share market prices. In this project, the projected price of one stock is determined using both its historical prices and other relevant current values. For our investigation, we have used stock data from the New York Stock Exchange. In order to forecast the future price of a stock, we employed the auto-regressive model in this research.

B. Specific Requirements

Input data and anticipated output data are used to train the model. It is important to go through the following stages in order to develop such a model:

□ Model construction: The algorithms for machine learning are used in model construction. It was neural networks in this project's instance. For the purpose of building the

model at this time, Keras is in communication with TensorFlow. Writing a loss function and an optimizer algorithm is crucial during model compilation. The accuracy of each prediction generated by the model is displayed via the loss function.

□ Model training: Model training is the next step after model construction. The model is trained in this phase utilising training data and anticipated results from the training set. The console displays a progress bar as the script executes. The model's final accuracy will be reported at the conclusion.

□ Model testing: A second set of data is loaded during this stage. Since the model has never encountered this type of data, its actual correctness will be checked. After model training is finished and it is recognised that the model accurately predicts the outcome.

□ Model evaluation: The saved model can then be applied to actual situations. We are evaluating a model here. This implies that new data can be evaluated using the model.

III. HIGH LEVEL DESIGN

System design is the process of defining a system's architecture, components, modules, interfaces, and data to satisfy preset requirements. It might be viewed as a systems theory application to the process of product development. The objective of system design is to create a technical solution that satisfies the functional requirements of the system. The functional specification developed during the system requirements analysis is used to build the physical architecture. System components are distributed throughout the physical architecture in order to build and test the system[8-9]. Usable interfaces are also designed and prototyped, and technical specifications are made for the application developers.

A. Design Considerations

EMBOT contains robot trading which of course will have a robot process running behind the application. This robot process will check the stock market model and invest into certain market to get the profit. The stock market model will be trained using past years market graph. The main drawback to be considered is the model won't be giving a full accuracy. So, the profit gaining margin won't be that high. Apart from that some of aspects are as follows:

- Interoperability - The software can be used in conjunction with other products that are designed to function well together. For instance, a piece of software may be backward compatible with a previous version of itself.
- Extensibility - The software's core architecture can be slightly modified in order to include new features.
- Fault-tolerance - The software can bounce back from component failure and is resilient to it.
- Maintainability is a metric measuring how simple it is to add functionality or fix bugs. High maintainability can be achieved through modularity and extensibility.

B. Assumptions and Dependencies

EMBOT at its initial stage will be developed by website and then later application will be introduced. The website will contain latest technology that is latest version of JavaScript and server language. These won't be supported by the old technology phones, so we expect the users to have a latest chrome browser. As for the operating system, as long the browser is able to support the scripting language, any device can be used. When later the application is

introduced, the specification will mostly be Android 5.0 or more. The IOS version will also be released. The software written will be for latest version of IOS, but it can also be supported for IOS 9 or more. Thus, trying to make the application available to more users.

C. General Constraints

There is no specific memory capacity for the web version, but considering the application, the minimum of 200mb will be required provided that the app was created using the flutter SDK. Minimum of RAM required will be 2GB, which actually won't matter if its 1GB as well. As far as we are concerned, if the network is fast enough the user can enjoy the application smoothly. Our product contains transactions, so basically the security will be taken into account. So, the users won't have to worry to invest into the application. It is one of the advantages of using blockchain for transaction. We recommend each user to create an account for verification purpose.

D. Class Diagram

With JavaScript's assistance, HTML and CSS will be used to create the website. Additionally, a server-side language named PHP will be used to communicate with the UiPath-hosted robot process. The development of flask modules will allow them to communicate with the stock market model. Since Flutter is popular and supported by both Android and iOS, it will be used to create an application. The remaining components for dealing with the stock market model will be the same as those of the website, a robot process, and the flask API.

The stock market model will follow the algorithm called KNN and LONG SHORT-TERM MEMORY (LSTM).

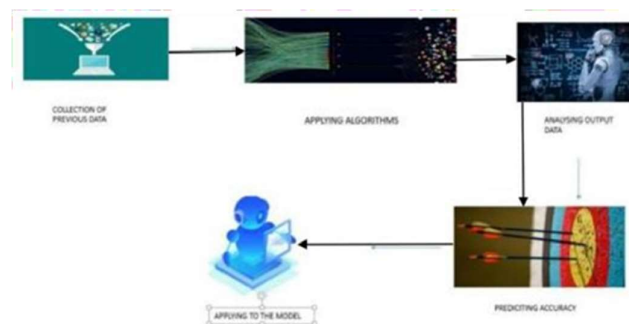


Figure 1. Training of stock market model

IV. DETAILED DESIGN

A. Algorithms

□ Long Short-Term Memory (LSTM)

Long short-term memory networks, or LSTMs, have been determined to be the most efficient solution for nearly all of these sequence prediction issues thanks to recent advancements in data science. In many ways, LSTMs are superior to RNN and traditional feed- forward neural networks. They have the ability to selectively remember patterns for extended periods of time, which explains this. This article's goal is to define LSTM and show how to apply it to practical issues. On the other hand, LSTMs only make minor adds and multiplications to the data. With LSTMs, the information travels via a system called cell states. LSTMs are able to selectively recall or forget things in this way[10]. Three separate dependencies exist between the

information at a specific cell state. They are used by businesses to transport goods around for various purposes.

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Pseudocode: sequence_len = 10 for i in range (0,sequence_len):
if i==0:
ht_1 = random() ct_1 = random() else:
ht_1 = h_t ct_1 = c_t
f_t = sigmoid (matrix_mul(Wf, xt) + matrix_mul(Uf, ht_1) + bf )
i_t = sigmoid (matrix_mul(Wi, xt) + matrix_mul(Ui, ht_1) + bi ) o_t = sigmoid
(matrix_mul(Wo, xt) + matrix_mul(Uo, ht_1)
+ bo)
cp_t = tanh (matrix_mul(Wc, xt) +
matrix_mul(Uc, ht_1) + bc) c_t = element_wise_mul(f_t, ct_1) + element_wise_mul(i_t,
cp_t)
h_t = element_wise_mul(o_t, tanh(c_t))
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□ K-Nearest Neighbors (KNN)

It frequently appears in the data mining process. Accordingly, this machine learning technique is utilised to resolve dataset regression and classification problems, in addition to its highly needed pattern recognition and intrusion detection capabilities. As implied by the name, this method deals with datasets that are close to one another. Data modules, distance, and vector modules are calculated and shown on the dataset to show how similar they are. Using the given dataset and the constant "k," which might be an integer number, the closest point is determined. The data are shown with the determined individual distance. The most acceptable terminology for this is euclidean. The distance data are arranged in ascending order and are aligned. The array is sorted using the closest distance index, "k," and the array is chosen. The dataset in question here deals with a large variety of values and their vicinity; it is scattered in nature and has many different categories [11]. It is more practical because of the dispersion of the same. It addresses the proximity of the data. Each division is broken down into little dataset pieces that are used to determine proximity and create results based on it. It's a simple algorithm, and it's operation is clear to understand.

Pseudocode:

1. Load the training and test data
2. Choose the value of K 3. For each point in test data:
 - find the Euclidean distance to all training data points
 - store the Euclidean distances in a list and sort it
 - choose the first k points
 - assign a class to the test point based on most classes present in the chosen points

4. End

V. IMPLEMENTATION

The implementation stage is the most important one in the development of any project since it yields the best solution to the issue at hand. During the implementation phase, the analysis from

the analysis document and the creation of the anticipated phase are actually put into practise. Prior to the implementation of any software, important decisions must be made on the platform to be utilised, the language to be used, etc. Numerous factors, such as the actual environment in which the system functions, the required speed, additional implementation- specific properties, etc., frequently influence these decisions. As organisations all around the world continue to believe in the power of automation and make it a fundamental component of their plans, RPA technology is already altering businesses of all types. RPA, or robotic process automation, can increase the productivity, flexibility, and profitability of your company.

A. Platforms Used

- **UiPath Studio**

UiPath Studio is sophisticated automation software that provides businesses with the governance tools they need to manage all of their software robots, as well as the ideal automation canvas for everyone, from business users to skilled RPA engineers. The application integration and automation of third-party applications, administrative IT duties, and business IT processes are all covered by UiPath Studio's basic and complicated solutions. The core of automation with UiPath solutions is the studio. Comprehensive workflows are created from activities in Studio, which are subsequently published to Orchestrator and carried out by the Robot.

- **Jupyter Notebook**

To create and share documents with live code, equations, visualisations, and text, you can use the free and open- source Jupyter Notebook web tool. The IPython project, which formerly had an IPython Notebook project of its own, gave rise to Jupyter Notebooks. The primary programming languages it supports are Julia, Python, and R, hence the name Jupyter. If you wish to use the Jupyter Notebook, you must install Jupyter Binomo because it is not included with Python. Binomo was established in 2014. Its parent company (Dolphin Corp.) is registered and located in St Vincent and the Grenadines. It has overcome the few teething challenges it had at inception and has transformed into a highly reliable trading platform. Binomo is an ingenious platform for trading online. Specifically, they offer expert brokerage services. With Binomo, we can comfortably trade currencies, commodities, and cryptocurrencies in the comfort of our home. Also, they provide expert tutorials and guidance for us to become a professional trader.

- **Visual Studio Code**

Visual Studio Code is a lightweight but powerful source code editor which runs on your desktop and is available for Windows, macOS and Linux. It comes with built-in support for JavaScript, TypeScript and Node.js and has a rich ecosystem of extensions for other languages (such as C++, C#, Java, Python, PHP, Go) and runtimes (such as .NET and Unity).

VI. CONCLUSION

According to academic studies, among other technology advancements, RPA is anticipated to produce a new wave of productivity gains and efficiency improvements in the worldwide labour market. RPA has altered how firms conduct their operations today, notably in terms of streamlining and improving operations. Although it is impossible for us to predict exactly how automation systems will develop in the future, there is strong evidence that RPA has a bright future. when automation is more widely adopted across a wider range of businesses and RPA becomes increasingly common. Despite the fact that the full benefits of automation technology will come to light, they will also be used to gain a key competitive edge in a number of congested, expanding industries. HTML, CSS, and JavaScript were used to build our website. This website uses MySQL as its database. We utilised PHP as the server language. The user can sign in to this website using their Aadhar card, bank account number, PAN number, or other credentials. Here, we offer a wallet option where users can contribute funds to their accounts on our website.

The project currently was completed using the website. This project can be further implemented using flutter SDK. The application design is yet to made. This product would look better when it is developed using mobile application instead of web application. As web application rises many security problems. The safest way would be to use the application.

The model we have developed was by using LSTM algorithm. This model doesn't give much of an accuracy. Therefore, in future works, we will be working on artificial neural network algorithms. This algorithm will be looking at the current affairs and this will look for the graphs also. Based on these two, it can predict more accurately and will be much better than the prediction model that was implemented using a SVM model.

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