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International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** VI **Month of publication:** June 2023

DOI: https://doi.org/10.22214/ijraset.2023.53954

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue VI Jun 2023- Available at www.ijraset.com

Visualization and Forecasting of Stocks Using Python and ML

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Abstract: ***Stock trading is one of the most important activities in the world of finance. Market forecasting is the act of trying to determine the future price of other financial instruments traded on the financial exchange . This document explains the forecasting of the market using machine learning. Most stockbrokers use technical and fundamental or time series analysis when making stock forecasts. The programming language used to predict stock markets using machine learning is Python. In this paper, we propose a machine learning (ML) approach that will learn from the data available at yfinance, and derive the intelligence and then use the information gained to make accurate predictions. In this case, this study uses a machine learning technique called LSTM to predict the closing price of stocks of five different stocks using the daily and price last minute frequency.***

Keywords: Stock Market, Machine Learning, Predictions, LSTM

I. INTRODUCTION

Basically, many traders with a lot of money on the exchange buy stocks and shares at cheap prices and then sell them at high prices. The difference between the stock market forecast is nothing new, but the issue has been discussed by many organizations. Stock analysis, where investors look at the value of products before investors invest in stocks, and business, trade, business mood, etc. . decides whether to invest or not. The Analysis is the transformation of market production statistics of the product, such as historical prices and volumes, through market studies.The advancement of machine learning in many industries in recent years has encouraged many traders to use machine learning in this field, and some have achieved very good results. This article will create a financial forecast program that will include all historical cost data and the data will be treated as training for the program. The main purpose of forecasting is to reduce uncertainty about investment decisions. The market is trending, which means that with tomorrow's price, your best guess is today's price. Needless to say, the stock index is very difficult to predict because requires an accurate forecasting model of market fluctuations.The stock market has changed a lot and is affecting the beliefs of traders. Due to the importance of financial world, known parameters (before closing date, P/E, etc.) and unknown (election results, rumors, etc.). There are many attempts to use machine learning to predict stock prices.

II. LITERATURE REVIEW

From the literature survey, it is clear that the machine learning techniques is applied for stock market vaticination across the world. Compared to contemporary vaticination techniques, these techniques are much more accurate

The research work done by Lufuno Ronald Marwala A dissertation submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Engineering. The weak form of Efficient Market hypothesis (EMH) states that it is impossible to forecast the future price of an asset based on the information contained in the historical prices of an asset. This means that the market behaves as a random walk and as a result makes forecasting impossible

The research work done by Dharmaraja Selvamuthu, Vineet Kumar and Abhishek Mishra Department of Mathematics, Indian Institute of Technology Delhi, Hauz Khas, New Delhi 110016, India. A stock market is a platform for trading of a company's stocks and derivatives at an agreed price. Supply and demand of shares drive the stock market. In any country stock market is one of the most emerging sectors. Nowadays, many people are indirectly or directly related to this sector. Therefore, it becomes essential to know about market trends. Thus, with the development of the stock 5 market, people are interested in forecasting stock price. But, due to dynamic nature and liable to quick changes in stock price, prediction of the stock price becomes a challenging task.

The research work done by Manh Ha Duong Boriss Siliverstovs. Investigating the relation between equity prices and aggregate investment in major European countries including France, Germany, Italy, the Netherlands and the United Kingdom.

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Increasing integration of European financial markets is likely to result in even stronger correlation between equity prices in different European countries. This process can also lead to convergence in economic development across European countries if developments in stock markets influence real economic components, such as investment and consumption. Indeed, our vector autoregressive models suggest that the positive correlation between changes equity prices and investment is, in general, significant. Hence, 6 monetary authorities should monitor reactions of share prices to monetary policy and their effects on the business cycle.

The research work done by Hyeong Kyu Choi, B.A Student Dept. of Business Administration Korea University Seoul, Korea. Predicting the price correlation of two assets for future time periods is important in portfolio optimization. We apply LSTM recurrent neural networks (RNN) in predicting the stock price correlation coefficient of two individual stocks. RNN's are competent in understanding temporal dependencies. The use of LSTM cells further enhances its long-term predictive properties.

III. METHODOLOGY

The following steps to be taken while defining the methodology of project visualization and forecasting of stocks using python an ML:

1) Aggregation: The first step is to identify the hypotheses that the investors obtained. This will include research, interviews and f ocus group discussions to understand their needs and expectations.
2) Analysis and design: Analyzes the system and determines its structure when necessary. This will include the creation of detailed documentation detailing the design, user interface and system flow.
3) Development: The system will be developed using the appropriate language and development platform such as streamlit. The development process will include designing the user interface and implementing the required functionality.
4) Test: The functionality, usability and functionality of the system will be tested. This will include unit testing, combination testin g and physical testing to meet specific needs.
5) Delivery: After the system is tested and available, it is sent to the production site. This includes installing the software compone nts, setting up the system, and doing all the necessary work.
6) Maintenance: After the system is commissioned, it will be regularly maintained to ensure it continues to function properly. This includes bug fixes, security patches and software updates to keep the system up to date and secure.

We propose an online web-based application that uses a learning model to estimate the value of items supplied. The challenge of this project is to predict the future open price of of a particular stock at a particular time in the future. For this project, we will use a Long Term Memory network, commonly known as LSTM, to predict the closing price of the stock using information about past prices. We use keras fed into the LSTM model to estimate the supply price using historical quoted prices and trading volume and find the estimated price, significance over time, and best of model. The model predicts 30 data points as input data and outputs the last data points .The model is installed as the backend of the website with the data integration function. Additional methods are roughly divided into two groups: statistical methods and artificial intelligence. The methods include logistic regression models and multilayer perceptrons, convolutional neural networks, single-layer LSTMs, support vector machines, recurrent neural networks, etc. They include artificial intelligence methods that contain and use short-term (LSTM).

IV. ARCHITECTURE

The system architecture of our project is mainly divided in some parts like data training data testing, splitting data into MinMaxScaler for feeding into LSTM model.

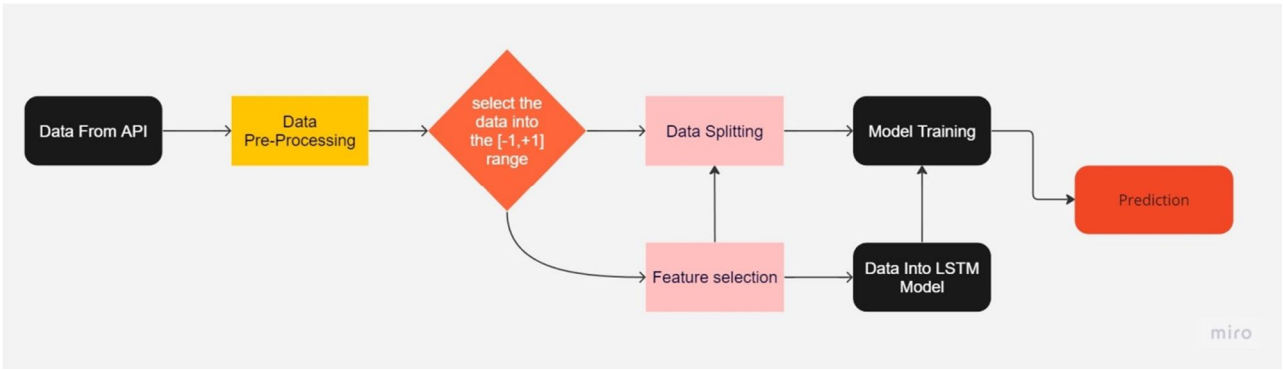


Fig1. Architecture of project

1) Problem statement: it is the initial stage where we find out the most problems faced by stock investors and especially new peoples who want to invest their money in stock market. After finding out the most probable problems we start gathering much possible solutions on that.
2) Requirement gathering: after finding the problems we start our most first step of project that is requirement gathering. Where we research a lot about this problem. Read the most related research papers. And start taking important topics to be implemented in our project
3) Finalize the model: there are many machine learning and deep learning models which may be used for prediction but every model has a their own disadvantages while working with time series data. our finalize model i.e. LSTM is the only model which can work better and efficiently with the time series data, that's why we choose it as our final model
4) Data collecting: for the forecasting purpose we collect the data from Yfinance of particular 5 stocks they are: "Adanient.Ns","Tatasteel.Ns","Pageind.Ns","Eichermot.Ns","Infy.Ns"
5) Data pre-processing: after collecting the data we work on to cleaning the data and fit it into MinMaxScaler for reliable data feeding.
6) Model training: The next step is to train a model on the pre-processed data. We use LSTM model which is a type of recurrent neural network that is well-suited for time series forecasting.
7) Web app building: after completing the Jupyter notebook for forecasting we use Streamlit framework of python to make web app.

Data collection
|
|__ Data preprocessing
|
|__ Model training
|
|__ Model evaluation
|
|__ Model deployment

The varity of tools in python allows us for data collection and data preprocessing. And it is important to note that the stock forecasting is challenging task. Many factors can affect the price of stock, and it is difficult to predict how that factor changing the future of stocks.

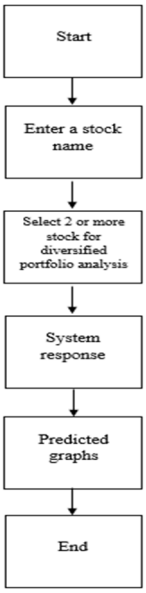


Fig.3 Flow chart

As we know LSTMs are able to process sequences of data by using a technique called "backpropagation through time" this technique allows the LSTM to learn the relationships between the different data points in the sequence. The main aim using LSTM is for better prediction. And for that we need more values loss from the sequential data that's why we used sequential method

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 lstm (LSTM)                 (None, 15, 32)            4352

 lstm_1 (LSTM)               (None, 15, 32)            8320

 lstm_2 (LSTM)               (None, 32)                8320

 dense (Dense)               (None, 1)                 33

=================================================================
Total params: 21,025
Trainable params: 21,025
Non-trainable params: 0
_________________________________________________________________
```

Fig4. Sequential model training

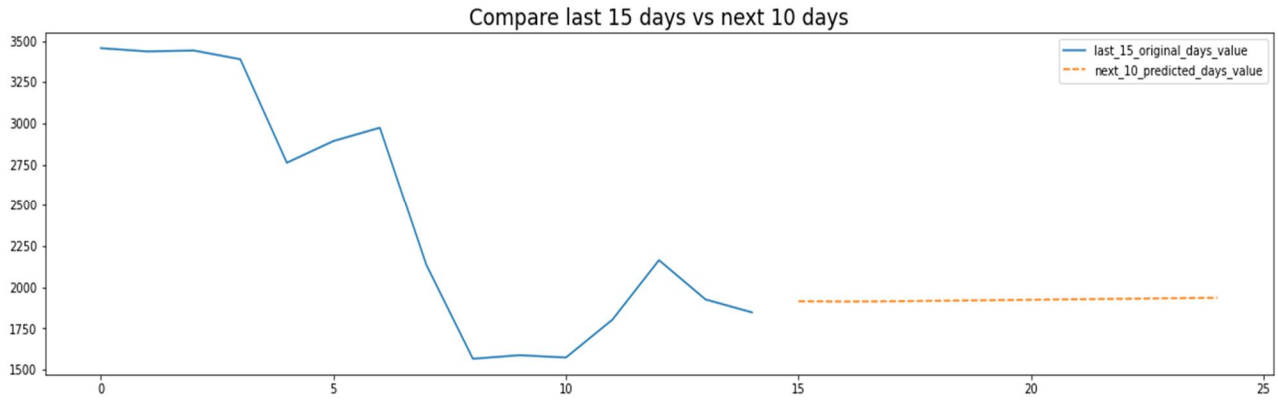


Fig5. Original vs predicted price comparison



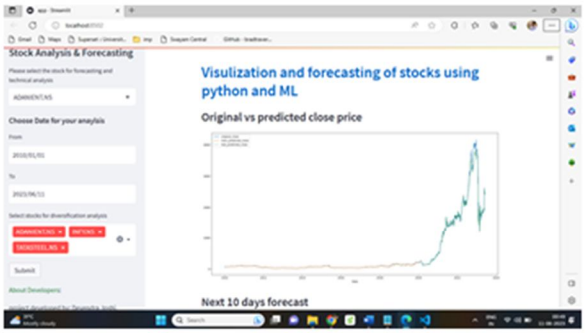
Fig6. Plotting final graph

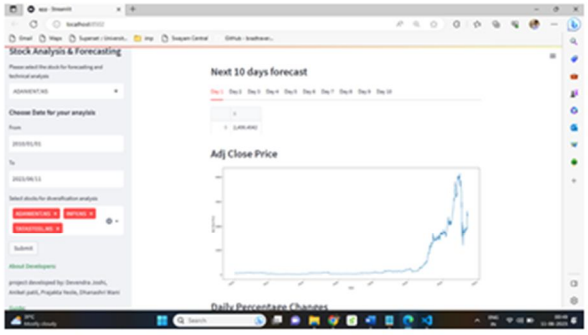
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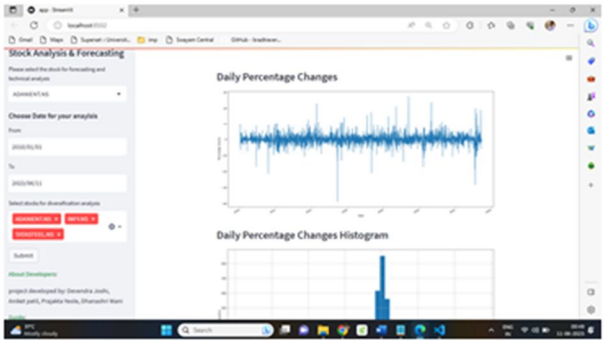
V. RESULT AND DISCUSSION

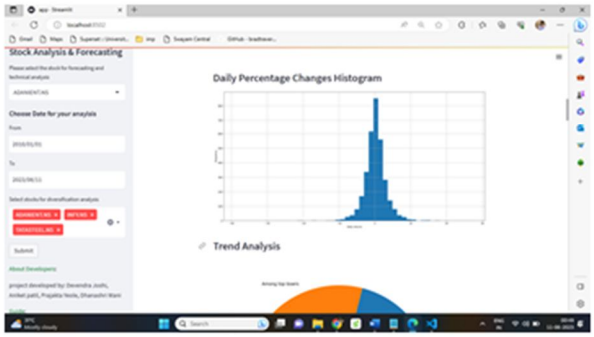
Once the final app is ready, we run it for multiple times and after doing some testing operations we got the final result

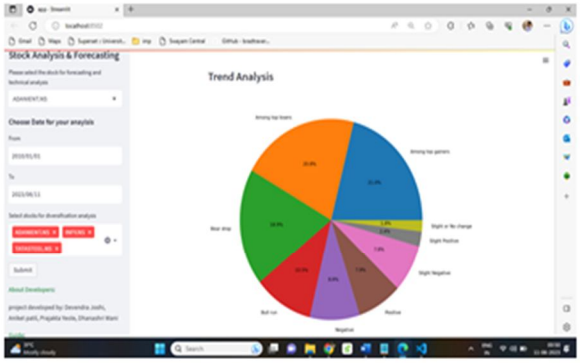
For the new users we add more tools that will help them to understand the stock market and there is also some of strategies for buying and selling of stocks.

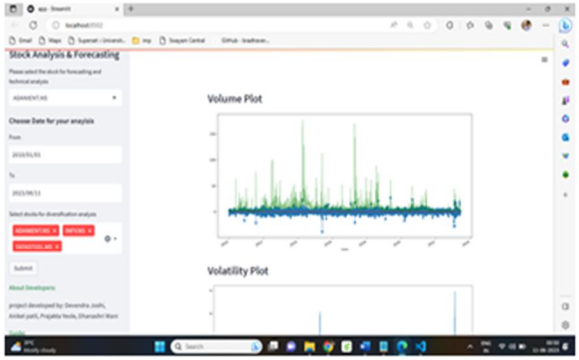


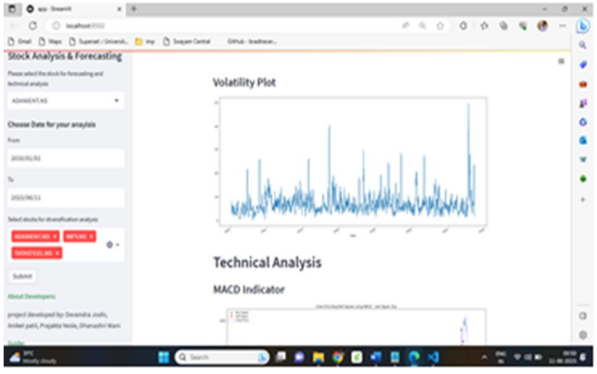






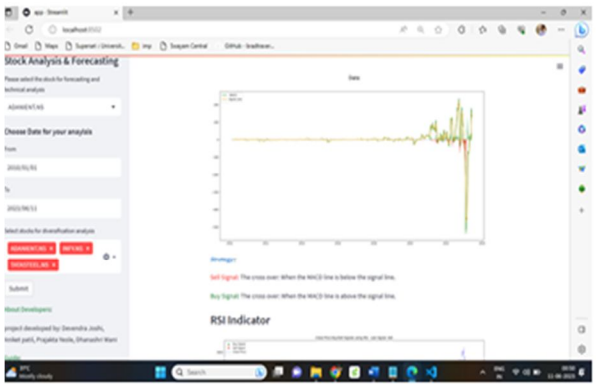






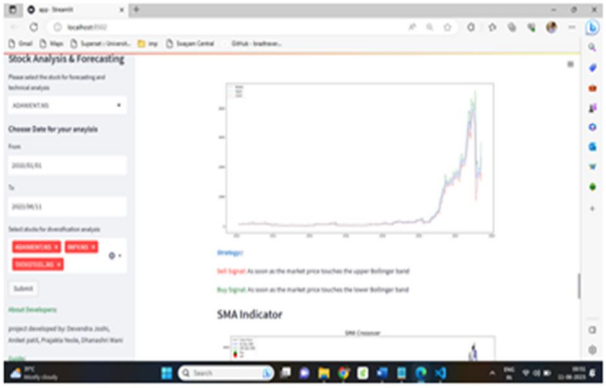


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Stock Analysis & Forecasting
RSI Indicator

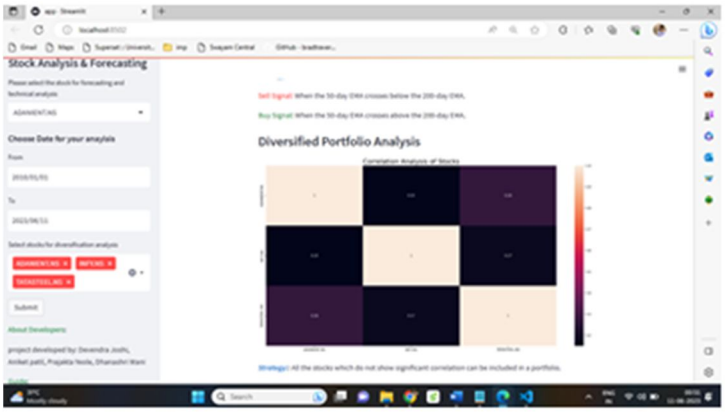

Stock Analysis & Forecasting
RSI Indicator


Stock Analysis & Forecasting
Bollinger Indicator


Stock Analysis & Forecasting
SMA Indicator


Stock Analysis & Forecasting
SMA Indicator
EMA Indicator


Stock Analysis & Forecasting
EMA Indicator
Diversified Portfolio Analysis


Stock Analysis & Forecasting
Diversified Portfolio Analysis

VI. CONCLUSION

Predicting the future has become the dream of most businesses and people because of the benefits of predicting the future. The stock price forecast will also be useful for those who want to learn about the business forecast. We studied 2 models, the Linear Regressio n model and the LSTM model, in which the LSTM model has better estimation compared to the Linear Regression model.

We predict the closing price of the selected products, we have developed an application that uses the LSTM algorithm to predict the closing price. We use Yahoo Finance data for certain companies such as "adanient.ns", "tatasteel.ns", "pageind.ns", "eichermot.ns", " infy.ns"and get very good accuracy for this product. In the future, we can expand this application to predict the cryptocurrency mark et and also add theories for better predictions.

We cannot assume that it is a completely correct model because during the run of this project we learned that economic forecasting i s impossible due to many errors. So this is just a educational level model for understanding the concepts of time series forecasting and working with real time model.

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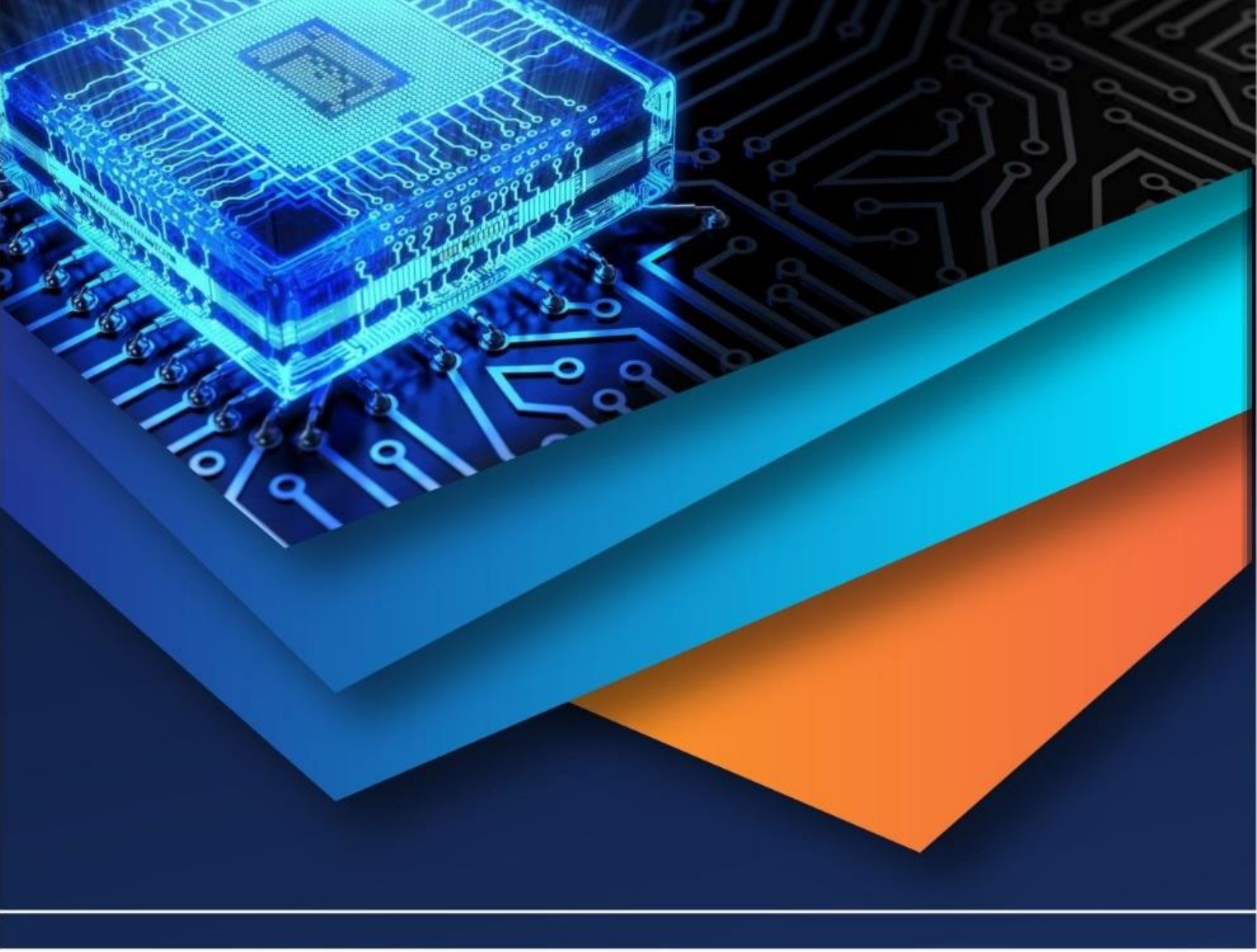
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