MINI PROJECT REPORT

on

"Stock Market Prediction"

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UNDER THE GUIDANCE OF

Prof. Sumit Shinde

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<u>CERTIFICATE</u>

This is to certify that this is a bonafide record of Mini Project of the project titled **"Stock Market Prediction"** carried out by the following students of third year in Information Technology.

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We have examined this report as per University requirements at SIES Graduate School of Technology, Nerul (E), Navi Mumbai on _____.

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II. ABSTRACT

The stock market refers to the collection of markets and exchanges where publicly traded companies' stocks are bought and sold. It is a place where buyers and sellers meet to exchange ownership of stocks or securities, representing a fraction of ownership in a company.

The stock market provides a means for companies to raise capital by selling stocks to investors, while investors can buy and sell these stocks as a way to invest in companies and potentially earn a return on their investment.

Stock market prediction refers to the use of statistical or machine learning models to forecast future trends and movements in the stock market. The goal of stock market prediction is to make accurate predictions about the future direction of stock prices based on historical data and other relevant factors.

Stock market predictions can be used by investors and traders to make informed investment decisions, hedge against potential losses, or identify profitable trading opportunities.

Overall, stock market prediction is a challenging task, as there are numerous factors that can influence the stock market, and unforeseen events can quickly change the market's direction. Nevertheless, accurate stock market predictions can provide valuable insights to investors and traders, helping them to make more informed decisions and potentially improve their returns.

Machine learning techniques have been widely used in recent years to model and predict stock prices based on historical data. In this project, we propose to use Python and machine learning algorithms to predict the future price trends of a set of stocks.

The project will involve collecting and preprocessing historical stock data, selecting relevant features, training and tuning different machine learning models, and evaluating the performance of the models using appropriate metrics. The proposed project has the potential to provide valuable insights into stock market dynamics and help investors make more informed decisions.

1. INTRODUCTION

Stock market prediction using machine learning is a field of study that involves developing models that can analyze historical stock market data to forecast future price trends. With the rise of big data and advances in machine learning algorithms, there has been a growing interest in using these techniques to predict stock market trends.

Machine learning models can analyze vast amounts of historical data and identify complex patterns and relationships between different variables. These models can be trained to predict future stock prices based on a variety of factors, such as past prices, economic indicators, news headlines, and social media sentiment.

There are different types of machine learning models that can be used for stock market prediction, such as regression, decision trees, random forests, support vector machines, and neural networks. These models can be fine-tuned and optimized to improve their accuracy and performance.

Stock market prediction using machine learning has the potential to help investors make more informed decisions, minimize risk, and identify profitable investment opportunities. However, it is important to note that the stock market is highly complex and influenced by a wide range of factors that can be difficult to predict accurately. Therefore, it is important to use caution when making investment decisions based on machine learning models and to consult with financial experts when necessary.

1.1 MOTIVATION

There are several motivations behind developing a stock market prediction project using machine learning. Some of the key motivations include:

Improving investment decision-making: By using machine learning models to predict stock prices, investors can make more informed decisions about when to buy, hold, or sell stocks. This can help them to minimize risk and potentially increase their returns.

Identifying profitable investment opportunities: Machine learning models can analyze vast amounts of historical data and identify patterns and trends that may be difficult for humans to spot. This can help investors to identify profitable investment opportunities that they may have otherwise missed.

Understanding market dynamics: Developing machine learning models for stock market prediction can provide valuable insights into market dynamics, such as how different economic indicators or news events can impact stock prices. This can help investors to better understand the market and make more informed decisions.

Advancements in machine learning: With the recent advancements in machine learning algorithms and big data analytics, it is now possible to develop models that can analyze large amounts of data and provide accurate predictions. This has led to a growing interest in using machine learning for stock market prediction.

Overall, the motivation behind developing a stock market prediction project using machine learning is to provide investors with valuable insights and tools to make more informed investment decisions, improve investment performance, and potentially identify new investment opportunities.

1.2.1 PROBLEM STATEMENT

Our project is Stock Market Prediction using machine learning, i.e to develop a model that can accurately predict future stock prices based on historical data and other relevant factors. The goal is to build a model that can provide accurate predictions over a specific time period, such as a few days, weeks, or months.

1.2.2 OBJECTIVES

- To develop a machine learning-based model that can accurately predict the stock prices of a particular company based on historical data.

- To implement linear regression and decision tree algorithms and compare their performance in predicting stock prices.

- To preprocess the historical data using Pandas, Numpy, and Datetime libraries to ensure that the data is in a suitable format for the machine learning models.

- To visualize the results of the models using Plotly and develop a user-friendly web interface using Streamlit.

2. LITERATURE SURVEY

Ishita Parmar, Navanshu Agarwal, Sheirsh Saxena, Ridam Arora, and Shikhin Gupta "Stock Market Prediction Using Machine Learning" [1] proposes a machine learning model for stock market prediction. The paper focuses on the use of Regression and LSTM based Machine learning to predict stock values. Factors considered are open, close, low, high and volume.

B N Varaprasad, Ch. Kundan Kanth, G. Jeevan, and Y. Kalyan Chakravarti "Stock Price Prediction using Machine Learning" [2] focuses on developing machine learning models for stock price prediction. In this paper for estimating the stock values we are considering LSTM and Regression models of Machine Learning. Factors considered are opening values of stock; closing values of stock, lower and higher values of stock and volume.

B. Shivani and S. P Govinda Rao "Stock Market Analysis & Prediction" [3] presents an overview of various techniques used for stock market analysis and prediction. Ton of studies have been done to predict stock exchange patterns utilizing Classical, AI, ML, and Deep learning methods. This study will help the pursuers and analysts in choosing algorithms that might be valuable for foreseeing the stock's performance.

Zaharaddeen Karami Lawal, Hayati Yassin, and Rufai Yusuf Zakari "Stock Market Prediction using Supervised Machine Learning Techniques: An Overview" [4] provides a comprehensive review of the use of supervised machine learning techniques for stock market prediction. The paper discusses the different machine learning algorithms such as linear regression, support vector machines, decision trees, and artificial neural networks that have been applied in stock market prediction.

Fernando Liko Marchai, William Martin, and Derwin Suhartono "Stock Prices Prediction using Machine Learning" [5] discusses the use of various machine learning techniques for stock price prediction. The paper provides an overview of the stock market and the importance of stock price prediction for investors and traders. The models are evaluated using one of the common error metrics, which is Root Mean Squared Error.

2.1 SURVEY OF EXISTING SYSTEM

TipRanks:

On the TipRanks website and app, you can view analyst forecasts on thousands of stocks from a diverse range of industries. There are stock screening tools that allow you to filter your options to find the most suitable investment.

ValueInvesting.io:

It provides a financial modeling service to offer investors a view into stocks' intrinsic value. You can also access stock analysis materials on the platform.

Koyfin:

Koyfin lets you screen stocks by various parameters to help you narrow your choices as you look for the most suitable investments. You can see Wall Street's consensus price targets on stocks and access market news.

TheStreet:

This website is more focused on providing financial news and market data. You can also access investing commentary and stock technical analysis on the platform.

LIMITATION OF EXISTING SYSTEMS

While machine learning models can analyze historical data and identify patterns, they may not be able to account for unforeseeable events that can significantly impact the stock market, such as natural disasters or political upheavals.

Some systems may rely solely on machine learning algorithms to make predictions without incorporating human insights and expertise. This can result in predictions that may not take into account the nuances of the market or specific industry trends.

3. PROPOSED SYSTEM

3.1 INTRODUCTION

- Data collection and preprocessing: Collect historical stock data and preprocess it by cleaning and transforming the data into a format suitable for analysis.
- Feature selection: Identify relevant features that may impact the stock prices, such as economic indicators, company performance metrics, news events, and investor sentiment.
- Train-test split: Split the data into training and testing sets, where the training set will be used to train the machine learning models, and the testing set will be used to evaluate their performance.
- Linear regression model: Train a linear regression model on the training set to predict the stock prices. Evaluate the performance of the model on the testing set using appropriate metrics, such as mean absolute error (MAE) and mean squared error (MSE).
- Decision tree model: Train a decision tree model on the training set to predict the stock prices. Evaluate the performance of the model on the testing set using appropriate metrics, such as mean absolute error (MAE) and mean squared error (MSE).
- Model deployment: Deploy the selected and fine-tuned model to make predictions on new data, and monitor its performance over time to ensure its accuracy and effectiveness.
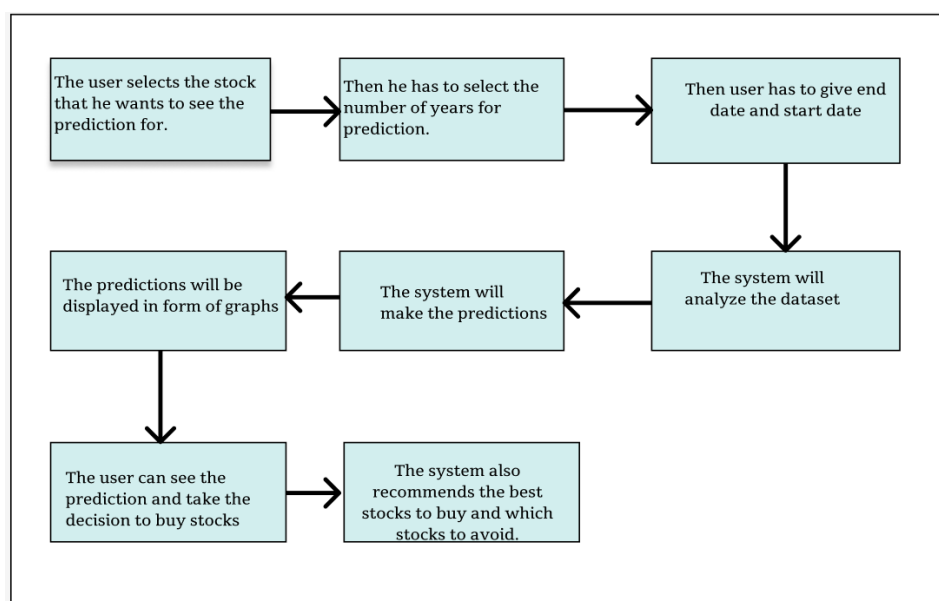
3.2 ARCHITECTURE

Fig 1: System Architecture

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3.3 DETAILS OF HARDWARE AND SOFTWARE

HARDWARE REQUIREMENT:

Processor: Intel Core Duo 5.0 GHz or more

RAM: 1 GB or More

Harddisk: 80GB or more

Monitor: 15" CRT, or LCD monitor

Keyboard: Any keyboard

Mouse: Compatible Mouse

SOFTWARE REQUIREMENTS:

Visual Studio Code: Visual Studio Code, also commonly referred to as VS Code is a source-code editor made by Microsoft with the Electron Framework, for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. Users can change the theme, keyboard shortcuts, preferences, and install extensions that add additional functionality.

Language used: Python

Python: Python is a high-level, interpreted programming language which is known for its simplicity, readability, and ease of use. It has a clean syntax that emphasizes code readability, which makes it easier for programmers to write and maintain code. Python supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

Libraries used: Pandas, Streamlit, Sklearn, plotly, yfinance, numpy, datetime

Streamlit:

Streamlit is a free and open-source framework to rapidly build and share beautiful machine learning and data science web apps. It is a Python-based library specifically designed for machine learning engineers.

Pandas: Pandas is an open-source Python library used for data manipulation and analysis. It provides data structures for efficiently storing and manipulating large datasets, as well as tools for cleaning, merging, and transforming data.

Scikit-learn (Sklearn): Scikit-learn is an open-source Python library used for machine learning. It provides a range of tools for classification, regression, clustering, and dimensionality reduction, as well as tools for model selection and evaluation.

Plotly: Plotly is an open-source Python library used for creating interactive visualizations. It allows developers to create a wide range of charts and graphs, including scatter plots, line charts, bar charts, and more.

yfinance: yfinance is a Python library that provides an easy-to-use interface for downloading historical stock price data from Yahoo! Finance. It allows developers to easily retrieve data such as stock prices, dividends, and stock splits.

NumPy: NumPy is an open-source Python library used for numerical computing. It provides data structures for efficiently storing and manipulating large arrays and matrices, as well as tools for performing mathematical operations on them.

datetime: datetime is a Python module used for working with dates and times. It provides classes for representing dates, times, and intervals, as well as tools for manipulating and formatting them. It is often used in conjunction with other libraries such as Pandas and NumPy for working with time-series data.
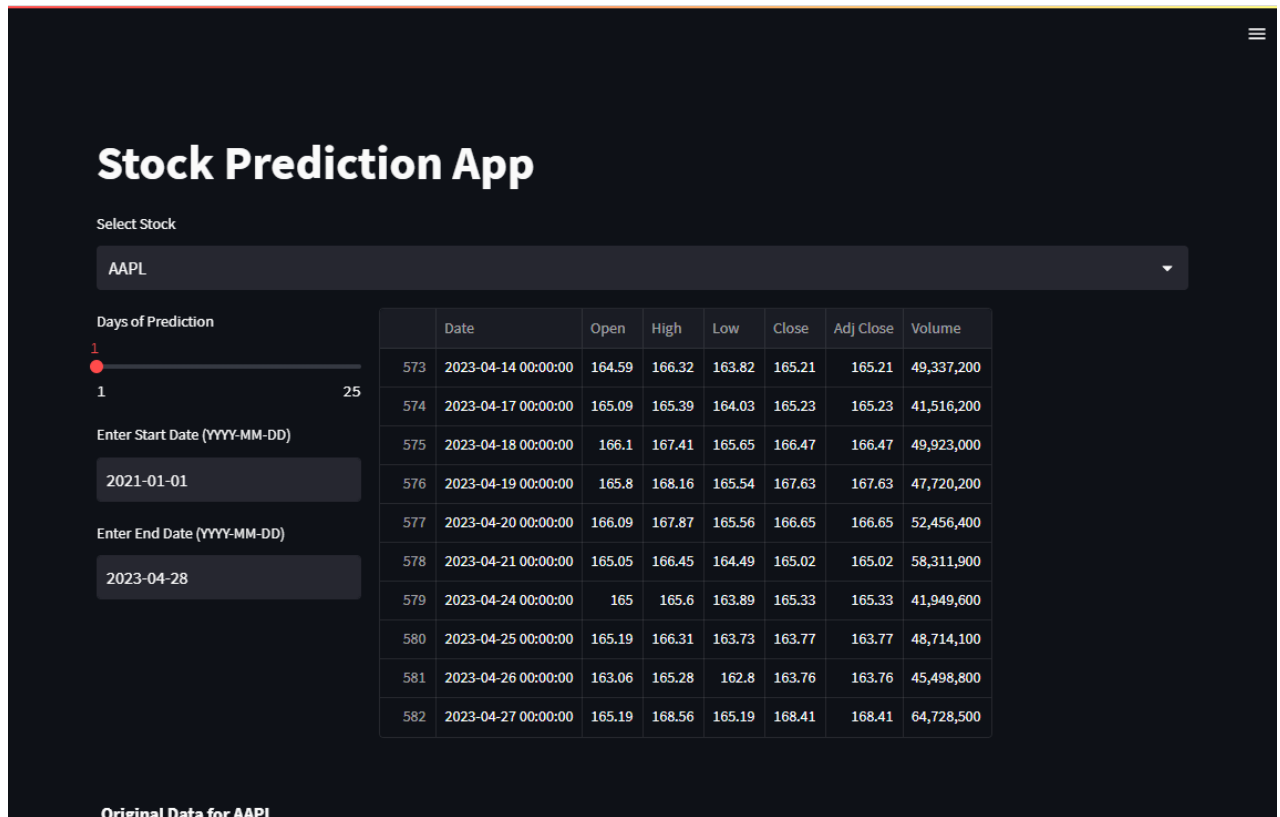
3.4 EXPERIMENT RESULTS

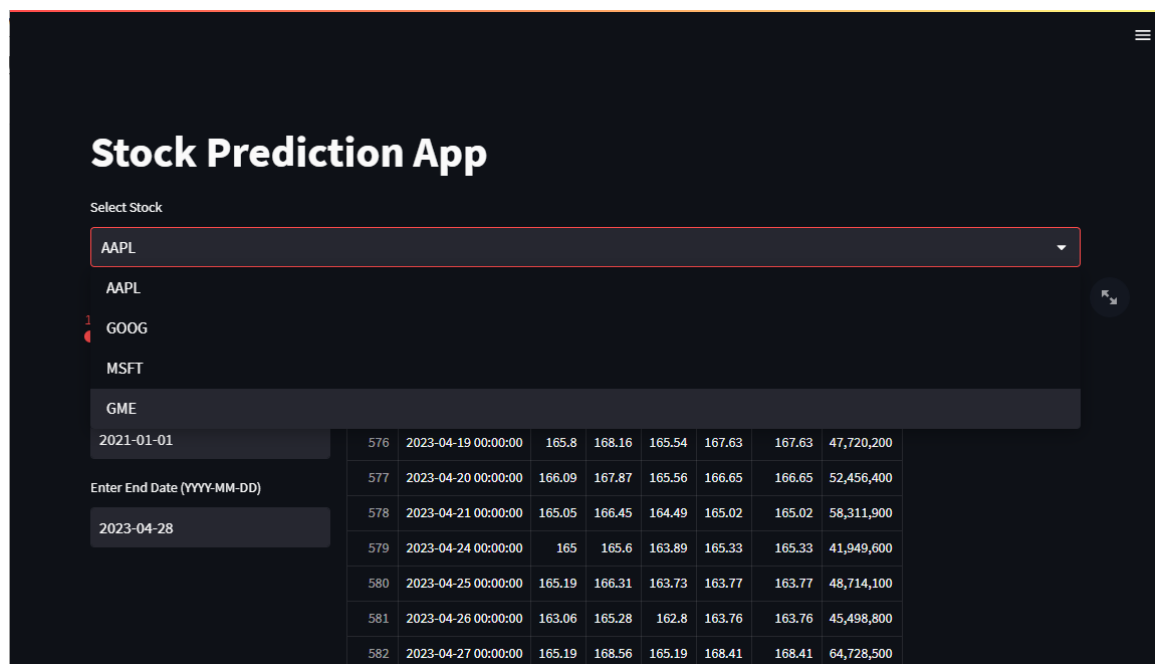### ⬧ Initial Stock Input Section

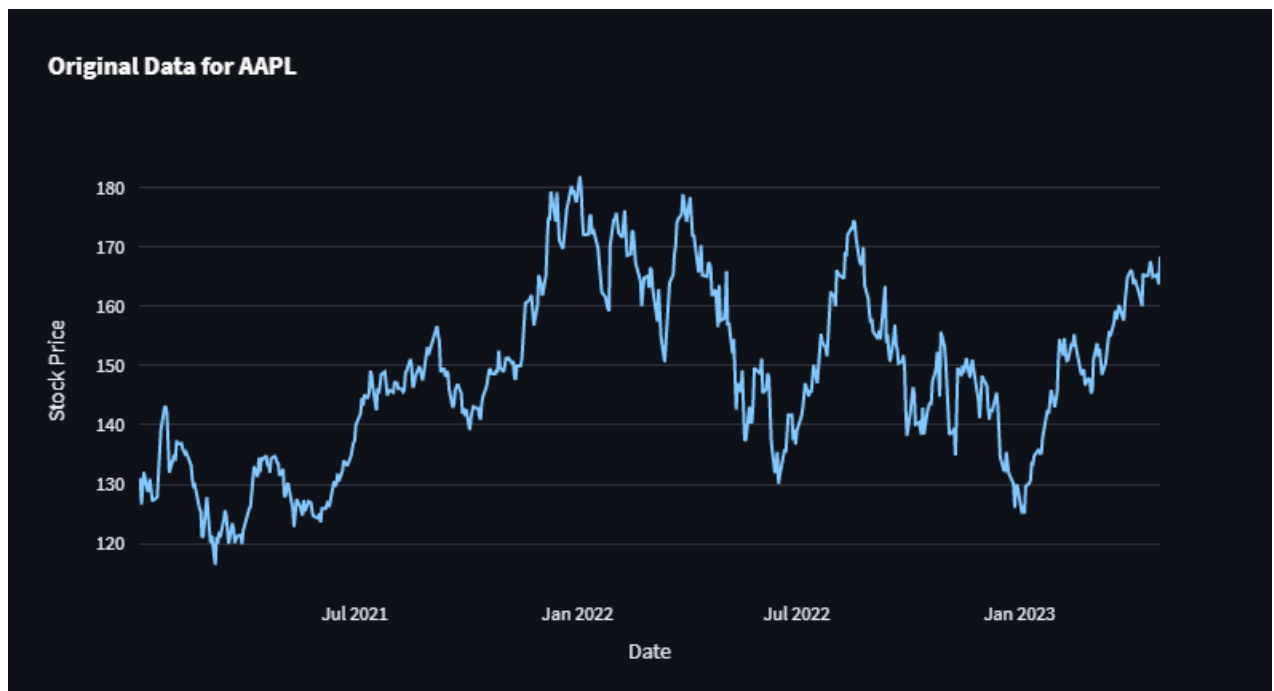Fig 2: Stock input page

⬧ Select Stock

Fig 3: Select stock

✚ Original stock data

Fig 4: Original Data

✚ View Predictions
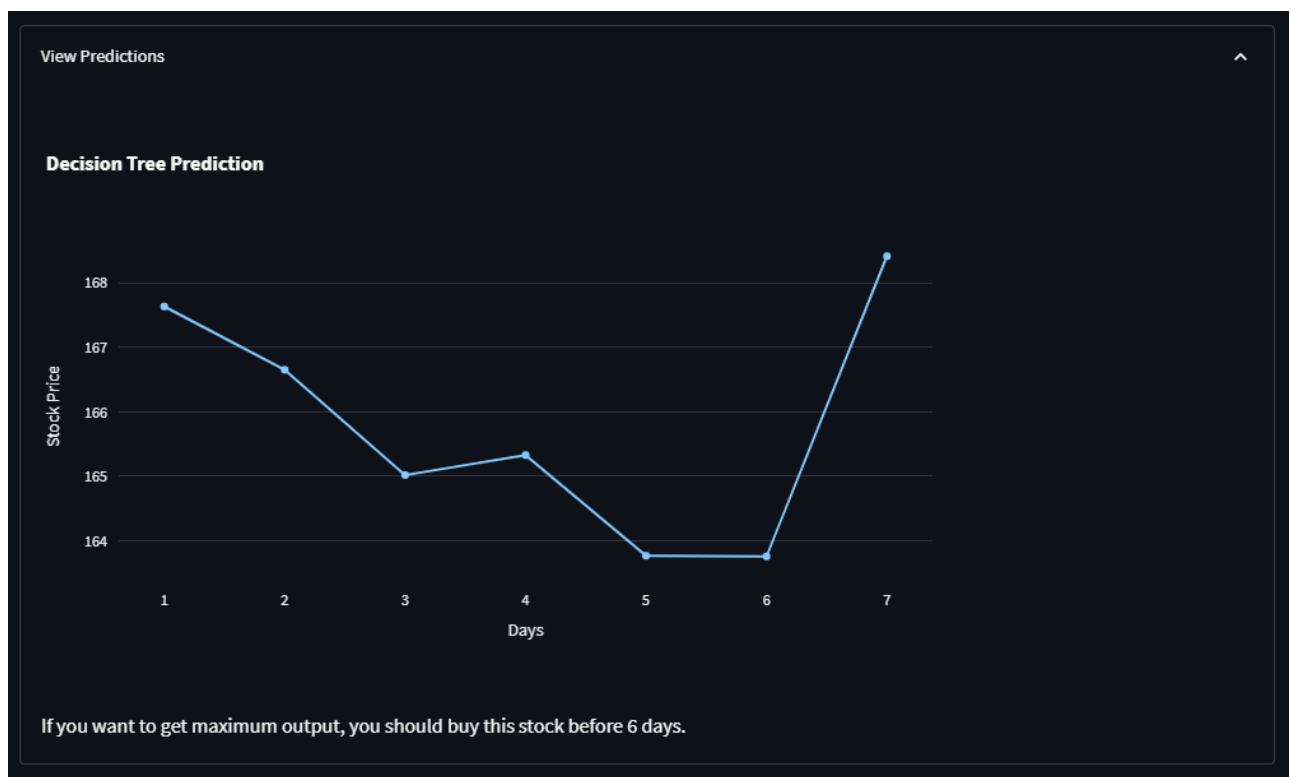
Fig 5: Decision Tree Prediction
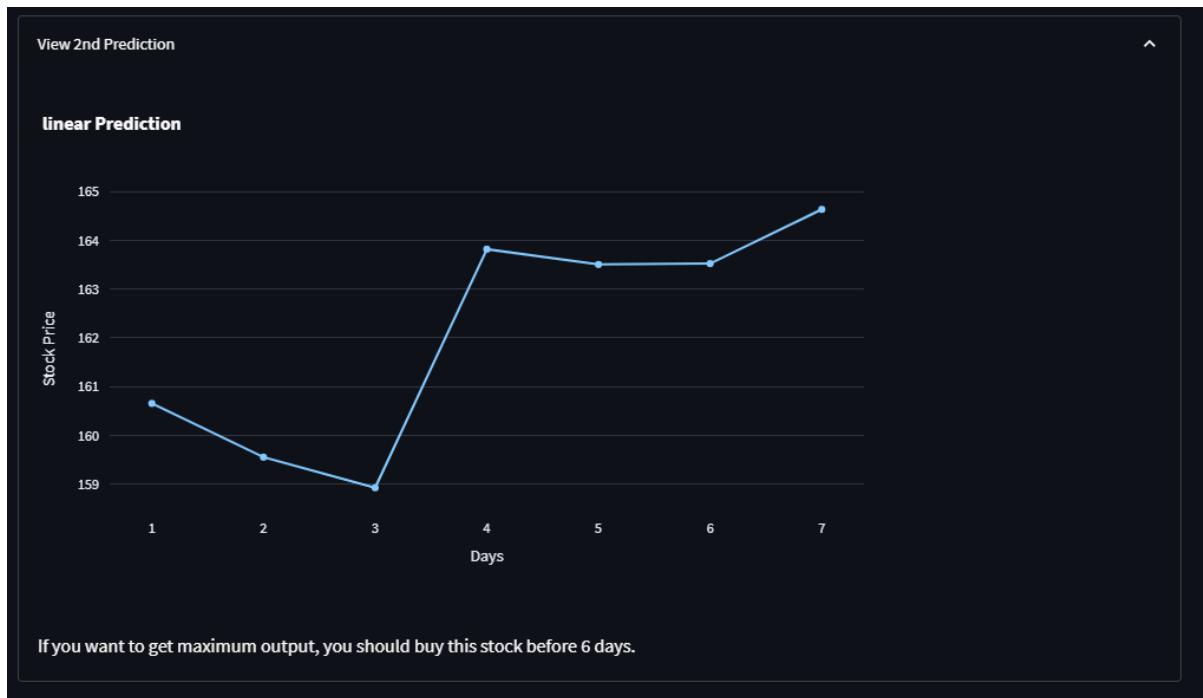
Fig 6: Linear Prediction

🔱 **Doubt field**

Fig 7: Doubt output

➕ History of selected Stock

History of AAPL :

Apple Inc. (AAPL) is one of the largest technology companies in the world, and its stock has been traded on the Nasdaq since 1980. Apple has been a leader in the technology industry for many years, and its stock has been one of the most widely traded stocks on the Nasdaq.

In the early days of Apple, the company was focused on the development of personal computers, such as the Apple II and the Macintosh. Apple was one of the pioneers of the personal computer revolution, and its products quickly became popular with consumers. Apple's success in the personal computer market allowed the company to expand its product line to include other consumer electronics, such as the iPod and iPhone.

Apple's stock began trading on the Nasdaq in 1980, and the company's stock price has seen many ups and downs over the years. In the early days, Apple's stock price was relatively low, and it stayed that way until the late 1990s. During this period, Apple's stock price rose steadily, and it reached an all-time high of $705.07 in September 2012.

Since then, Apple's stock price has been volatile, but it has generally remained in a positive trend. In recent years, Apple's stock price has been driven by strong sales of its iPhones and other products, as well as the company's growing presence in the technology sector.

In addition to its stock price, Apple's financial performance has been impressive. The company has consistently reported strong revenue growth and profits, and it has been able to maintain a strong balance sheet. Apple's financial performance has been a key factor in its stock price performance, and the company's stock price has been supported by strong earnings growth.

Apple's stock price has also been affected by external factors, such as economic conditions and the performance of other technology stocks. The company's stock price has been volatile over the years, and it has been affected by the performance of the overall technology sector. In recent years, Apple's stock price has been supported by strong sales of its products and services, as well as the company's strong financial performance.

Overall, Apple's stock price has been a roller coaster ride over the past four decades. The company's stock price has seen many highs and lows, but it has generally been in a positive trend since the late 1990s. Apple's stock price has been driven by strong sales and financial performance, as well as external factors such as the performance of the overall technology sector.

Fig 8: History of stock

➕ Investment details of stock

Investment in AAPL :

The decision to invest in a company is a personal one and should be based on an individual's risk tolerance, investment goals, and financial situation. Apple Inc. (AAPL) is a large and well-established company that has been around for over 40 years and is a leader in the technology industry. This makes it a relatively safe investment option for many people.

Apple is a well-known and respected brand that is associated with innovation and quality products. Its products are popular with consumers, and the company has a strong presence in many markets around the world. Apple's products have also been successful in the enterprise market, making it a leader in the space.

The company's financials are strong, with a market capitalization of over $1 trillion and a trailing 12-month revenue of $265 billion. The stock has also been performing well, with a year-to-date return of over 40%. This is due in part to the company's strong fundamentals, such as its strong balance sheet and consistent cash flow.

Apple's financials are also supported by its strong dividend yield, which currently stands at 0.82%. This is higher than the S&P 500 average, making it an attractive option for dividend investors. The company also has a strong track record of increasing its dividend, which has risen every year since 2012.

The company's products and services are also expected to continue to grow as the company expands into new markets, such as the healthcare sector. Apple's products are also expected to benefit from the increasing popularity of mobile and wearable technology.

In terms of risks, Apple's products are not immune to competition, and the company could face pressure from new entrants into the market. The company also faces the risk of changing consumer tastes and preferences, which could impact its ability to remain competitive. Additionally, the company's stock price could be impacted by macroeconomic factors, such as changes in interest rates and the global economy.

Overall, Apple is a strong company with a long history of success. Its products are well-regarded, and the company has a strong presence in many markets. Its financials are also strong, and the stock has been performing well. The company also offers a strong dividend yield and has a track record of increasing it. Additionally, the company's products and services are expected to continue to grow, and the company could benefit from the increasing popularity of mobile and wearable technology. However, the company does face some risks, including competition and changing consumer tastes.

Ultimately, whether or not to invest in Apple is a personal decision that should be based on an individual's risk tolerance, investment goals, and financial situation. However, for many investors, Apple could be a good option due to its strong fundamentals and potential for future growth.

Fig 9: Investment

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4. APPLICATIONS

- Investment decision-making: Investors can use the predicted stock prices to make informed decisions about which stocks to buy, sell, or hold.

- Risk management: Predicting stock prices can help investors and financial institutions manage their risk exposure by adjusting their investment portfolios accordingly.

- Algorithmic trading: Machine learning-based models can be used to develop algorithmic trading strategies that buy and sell stocks automatically based on predicted prices and market conditions.

- Portfolio optimization: Machine learning models can be used to optimize investment portfolios by identifying the most profitable stocks and minimizing the risk associated with each investment.

- Market analysis: The predicted stock prices can be used to analyze market trends and make informed decisions about the overall direction of the stock market. This information can be useful for financial analysts, economists, and policymakers.

FUTURE SCOPE

Future work can focus on improving the accuracy of the models by incorporating more complex algorithms, integrating new data sources, and leveraging advancements in deep learning.

5. CONCLUSION

This project utilized linear regression and decision tree algorithms to predict the stock prices based on historical data. The results showed that both models can provide accurate predictions with a low error rate. The project also utilized various Python libraries such as Pandas, Streamlit, Sklearn, plotly, yfinance, numpy, and datetime to collect and preprocess the data, visualize the results, and develop a user-friendly web interface.

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