Stock Analysis and Forecasting Project

A **Stock Analysis and Forecasting Project** in data science involves analyzing historical stock market data to identify graphs, patterns and trends, enabling predictions of future stock prices. It utilizes statistical techniques, machine learning models, and financial indicators to assess market performance. The project aims to provide insights for investors, aiding in risk management, portfolio optimization, and decision-making, with the ultimate goal of maximizing returns in stock market investments.

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Problem Statement:-

- Investors and financial analysts face significant challenges in predicting stock prices due to market volatility and various influencing factors, including economic events, company performance, and market sentiment. Traditional forecasting techniques often fall short in accurately predicting future price movements, leading to suboptimal investment decisions.

- This project aims to leverage machine learning models to analyze historical stock data and forecast future stock prices. By utilizing data such as open, close, high, and low prices, as well as trading volumes and financial indicators, the project will develop predictive models like ARIMA, LSTM, and XGBoost. These models will help identify trends, patterns, and potential price movements to improve decision-making for traders and investors.

- The goal is to compare the performance of different forecasting techniques and provide a reliable model for short-term and long-term stock predictions.

Objectives:-

1. Analyze Historical Stock Data:

- Gather historical stock price data and related financial metrics from API's. (e.g., Yahoo Finance, Alpha Vantage).
- Perform a thorough analysis of stock price data (such as open, close, high, and low prices).
- Visualize price movements over time and identify trends.

2. Calculate Technical Indicators:

- Calculate key technical indicators such as the Moving Averages (1 week, 1 month and 1 year) to observe long-term and short-term trends.
- Clean and structured data ready for analysis and model training.

3. Build Predictive Models:

- Train models like Linear Regression, Decision Trees, Random Forests, or LSTM (Long Short-Term Memory) for time series forecasting.
- Evaluate model performance using metrics like root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE).

4. Forecast Stock Prices:

- Implement time-series forecasting techniques such as ARIMA (Auto Regressive Integrated Moving Average) to predict future stock prices over short-term horizons.

5. Visualize Predictions:

- Compare actual vs. predicted stock prices through clear visualizations, allowing for easier interpretation and decision-making.

Technology Used

Python

Python served as the primary programming language for this project, providing a robust ecosystem of libraries and frameworks for data manipulation, analysis, and machine learning.

Numpy and Pandas

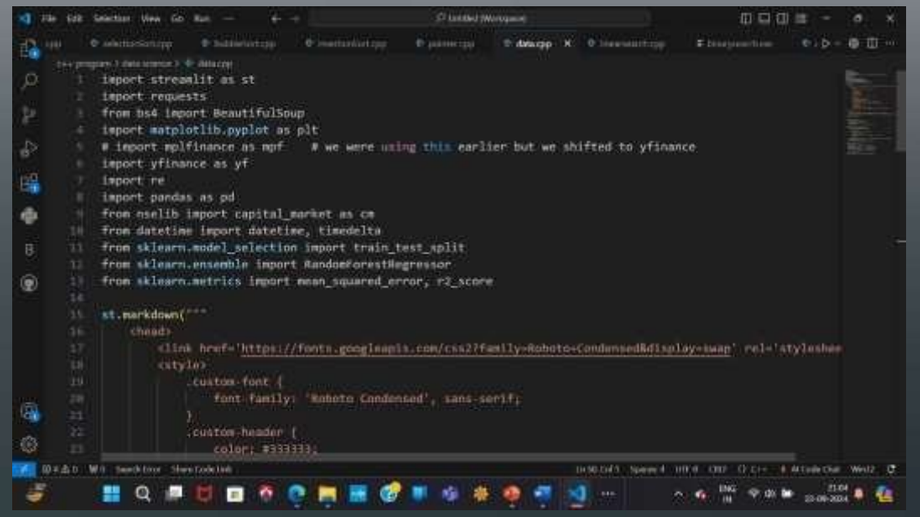
Numpy and Pandas is a powerful library for data manipulation and analysis, offering functionalities for data cleaning, transformation, and exploration. It was extensively used in this project to work with the stock data efficiently.

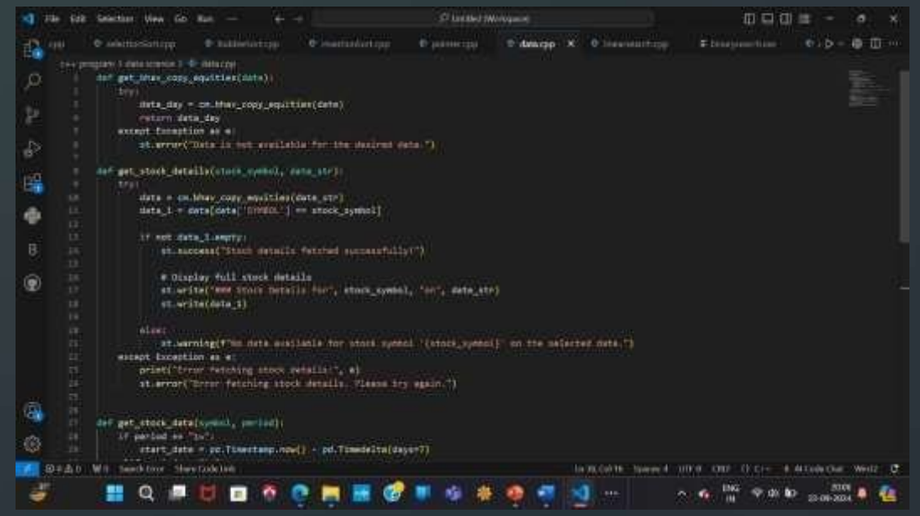
Scikit-learn

Scikit-learn is a comprehensive machine learning library providing a wide range of algorithms for classification, regression, clustering, and dimensionality reduction. We utilized its algorithms for model training, evaluation, and prediction.

Matplotlib

These libraries were crucial for data visualization, enabling us to create insightful graphs, patterns and charts to understand the data trends, model performance, and final results.





Data Set:-

Here is a Glimpse of the dataset we are using:-

	A	B	C	D	E	F	G
1	Date	Price	Open	High	Low	Vol.	Change %
2	03/27/2024	173.31	170.3	173.58	170.14	59.11M	2.12%
3	03/26/2024	169.71	170.01	171.41	169.65	57.22M	-0.67%
4	03/25/2024	170.85	170.37	171.94	169.46	54.21M	-0.83%
5	03/22/2024	172.28	171.76	173.05	170.06	71.16M	0.53%
6	03/21/2024	171.37	177.05	177.49	170.84	106.18M	-4.09%
7	03/20/2024	178.67	175.72	178.67	175.09	52.41M	1.47%
8	03/19/2024	176.08	174.34	176.6	173.03	54.85M	1.36%
9	03/18/2024	173.72	175.57	177.71	173.52	75.08M	0.64%
10	03/15/2024	172.62	171.17	172.62	170.29	119.99M	-0.22%
11	03/14/2024	173	172.91	174.31	172.05	72.57M	1.09%
12	03/13/2024	171.13	172.77	173.18	170.76	51.95M	-1.21%
13	03-12-2024	173.23	173.15	174.03	171.01	59.55M	0.28%
14	03-11-2024	172.75	172.94	174.38	172.05	60.14M	1.18%
15	03-08-2024	170.73	169	173.7	168.94	76.27M	1.02%
16	03-07-2024	169	169.15	170.73	168.49	69.37M	-0.07%
17	03-06-2024	169.12	171.06	171.24	168.68	66.98M	-0.59%
18	03-05-2024	170.12	170.76	172.04	169.62	93.55M	-2.84%
19	03-04-2024	175.1	176.15	176.9	173.79	80.08M	-2.54%
20	03-01-2024	179.66	179.55	180.53	177.38	73.56M	-0.60%
21	02/29/2024	180.75	181.27	182.57	179.53	135.28M	-0.37%
22	02/28/2024	181.42	182.51	183.12	180.13	48.95M	-0.66%
23	02/27/2024	182.63	181.1	183.92	179.56	54.32M	0.81%

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Link of the dataset:- https://www.kaggle.com/datasets/shiivvvaam/apple-stock-market-historical-data-1980-2024?resource=download