Journal

Program: MSc in Artificial Intelligence

Course: Programming For Artificial Intelligence

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This is the journal maintained over the course of this project, where I have mentioned what activities were carried out by me and my teammates and challenges faced and all important points

02/12/2024: Team discussion regarding the topic selection and project work distribution among each other.

All 4 of us sat together and started discussing about the project deliverables and what is the expected results. Since the objective is revolving around Datasets and Machine Learning Algorithms, we decided to think of the topic on which we are going to work.

05/12/2024: Next team meeting on topic finalization

From the last meeting we were clear about the objective, and everyone came up with some topics which we can consider. My teammates suggested topics like Sentiment analysis and weather forecasting and prediction using AI/ML techniques. At the beginning, we all agreed to work on Sentiment Analysis from Twitter data.

10/12/2024: Topic change because we wanted to work on something different.

Sentiment analysis using twitter data was already done by me in Data Analytics project. I had a grip on some algorithms like LogisticRegression and Classifiers, but I wanted to work on some different algorithms which are related to time series forecasting. So, we decided to work on Stock price analysis and prediction using Regression models.

15/12/2024: Dataset collection and further analysis.

After going through many websites and datasets, some good datasets were selected by the team. Kshitij gave an idea for using one of the inbuilt libraries like y-finance which gives data for different stock prices. Which seemed to be a good idea at first. And we started to work on it, how to include y-finance and working on the coding part.

20/12/2024: Coding process

As kshitij was working on including y-finance module to fetch the stock data, I was brainstorming on how we can apply the Machine Learning Algorithms to the datasets which gives best results. Initially Linear Regression was looking a better option, as it is simple to understand and implement and it is easier to interpret the output coefficients. Even tough it is vulnerable to over-fitting but we could manage it by dimensionality reduction techniques.

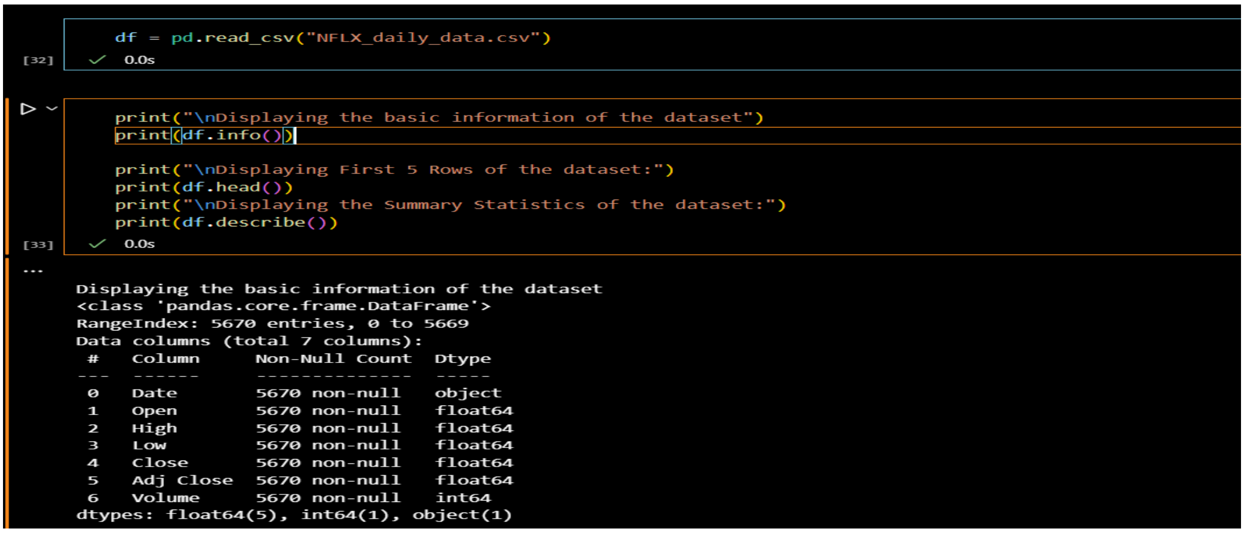
But later I thought This ML model works best when dataset is having Linear relations. But as we know stock price predictions and values are never linear. The relationships varies everyday. Hence I decided to go with other regression models.

22/12/2024: Taking proper datasets(csv files) instead of y-finance module

Hitesh suggested that y-finance module has some disadvantages and the objective of the project might be missed. As we need to collect data and preprocess and we need to keep checking and comparing the trends, so it would be better to get a proper datasets which has Stock values like Opening, Closing and Highest stock values for the day.

Shravani got the datasets from Kaggle which suits best for our project. Here is the link for the datasets (https://www.kaggle.com/datasets/zongaobian/netflix-stock-data-and-key-affiliated-companies). We have stock prices of many different companies (multiple datasets) but which are interlated to each other. So we decided to do Netflix Stock Prediction along with other stocks(Amazon, Nvidia, SONY) which are highly interrelated with Netflix stocks.

23/12/2024: All of us took one dataset each and started working on the datasets and working on the code part. I took Netflix Stock data and imported required dependencies and loaded dataset into VS-Code. Started displaying the dimensionality of it and important features.

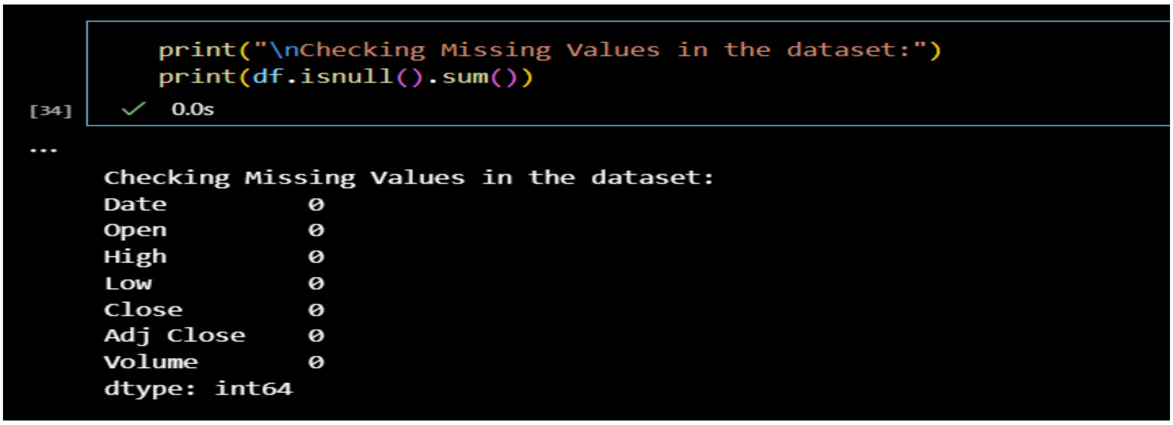


```
df = pd.read_csv("NFLX_daily_data.csv")
```

```
print("\nDisplaying the basic information of the dataset")
print(df.info())

print("\nDisplaying First 5 Rows of the dataset:")
print(df.head())
print("\nDisplaying the Summary Statistics of the dataset:")
print(df.describe())
```

```
Displaying the basic information of the dataset
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5670 entries, 0 to 5669
Data columns (total 7 columns):
 #   Column     Non-Null Count  Dtype
---  ------     --------------  -----
 0   Date       5670 non-null   object
 1   Open       5670 non-null   float64
 2   High       5670 non-null   float64
 3   Low        5670 non-null   float64
 4   Close      5670 non-null   float64
 5   Adj Close  5670 non-null   float64
 6   Volume     5670 non-null   int64
dtypes: float64(5), int64(1), object(1)
```

As it is important to understand the important features and data types of the datasets, I decided to visualize my dataset. But before that I needed to check If there are any missing values in the datasets, because missing values might create problems and causes errors in the code while applying ML Algorithms or while plotting graphs.



```
print("\nChecking Missing Values in the dataset:")
print(df.isnull().sum())
```

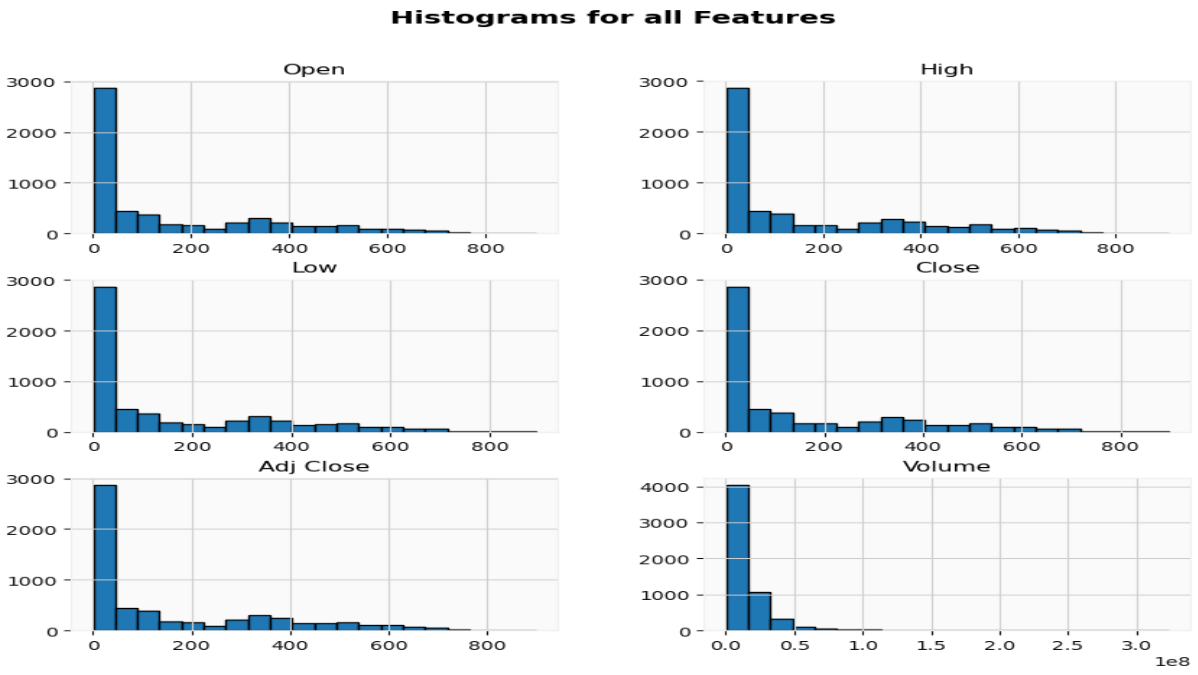
```
Checking Missing Values in the dataset:
Date         0
Open         0
High         0
Low          0
Close        0
Adj Close    0
Volume       0
dtype: int64
```

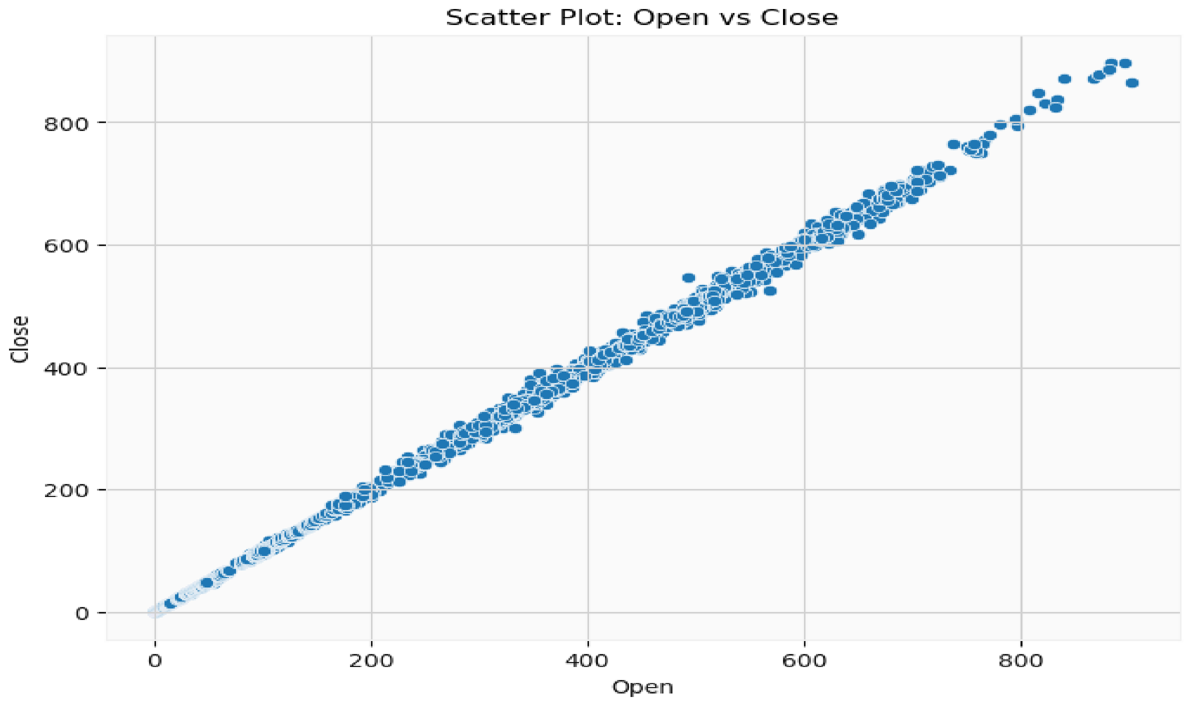
I found out that this is a clean dataset, which has no missing values. Hence there was no need to remove any rows or columns.

24/12/2024: Data Preprocessing and EDA(Exploratory Data Analysis)

Once I was sure about handling missing values, I thought removing outliers would be great so that we have less data to work upon. But if we think about it, in stock predictions, we cannot remove any entries just because it is an outlier. We need each day data to check and predict the future stock prices, so we need data for all the days. Hence I did not remove any outliers. And started plotting graphs for data visualization.

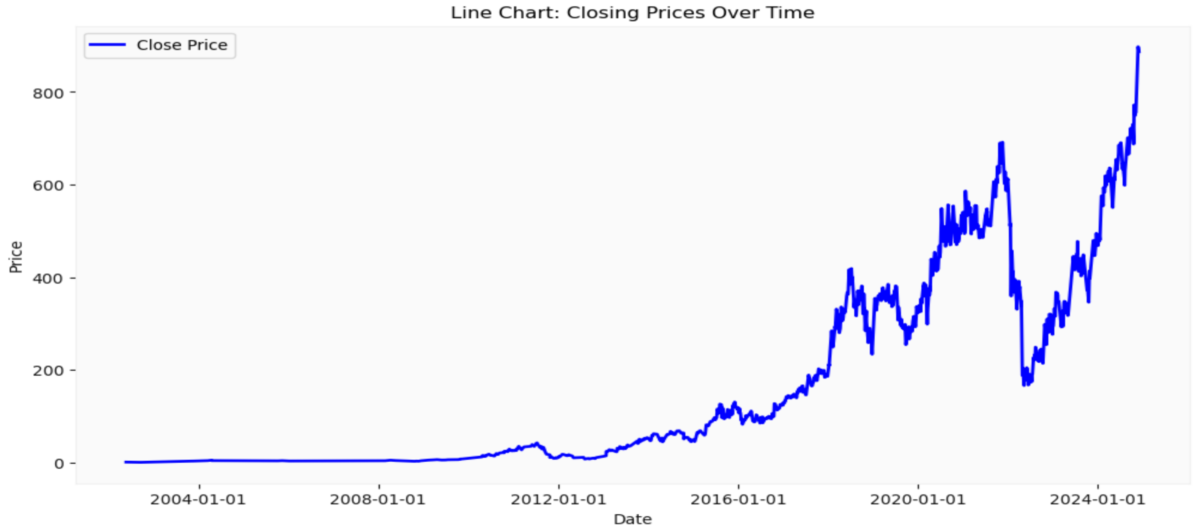
First I plotted histogram for all the features and then Scatter plot for Opening and Closing values of the stock. This gives us the idea of the top and bottom constraints for the stock.





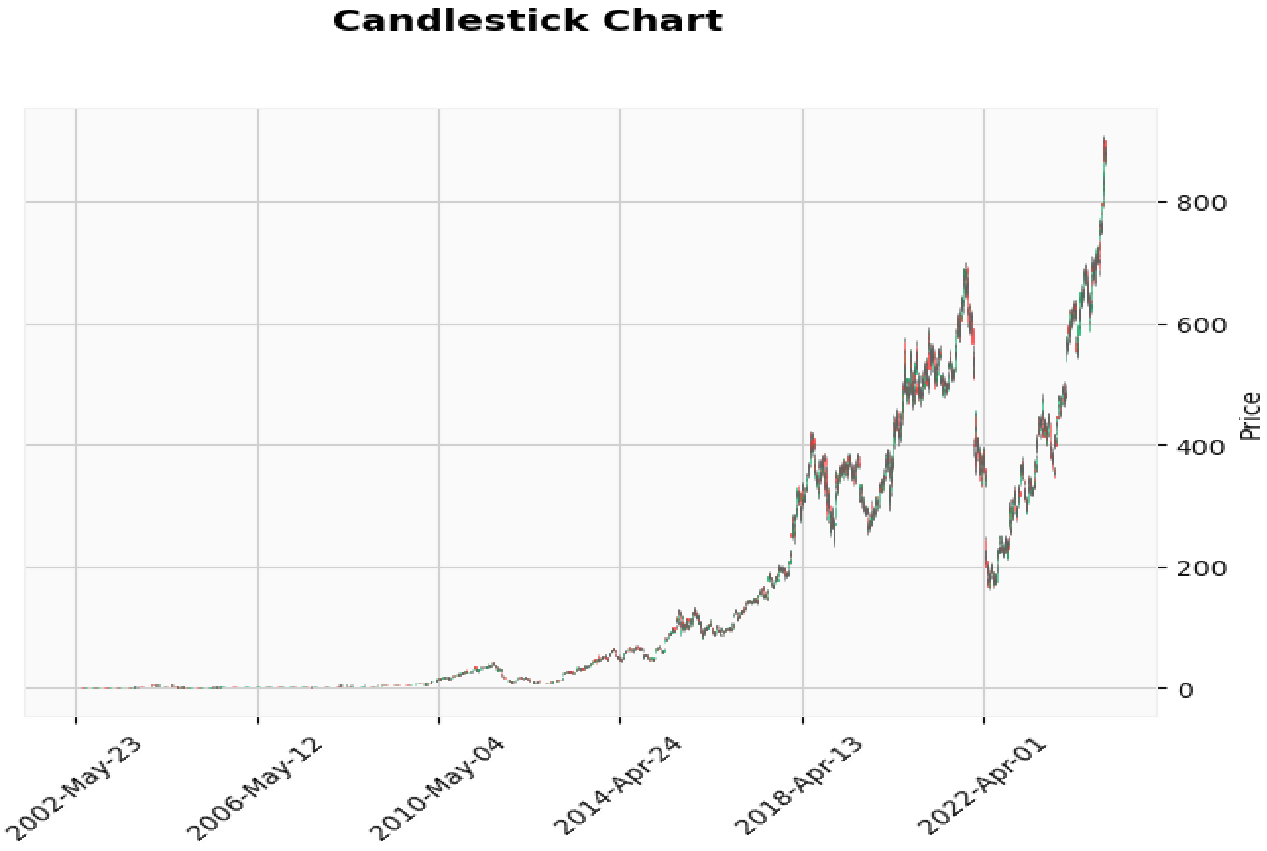
Then decided to plot pair plots, to understand the relations between all the features. But the most important relations pair were (Open, Close) and (High, Low). This gives overall picture of the stock price over the years.

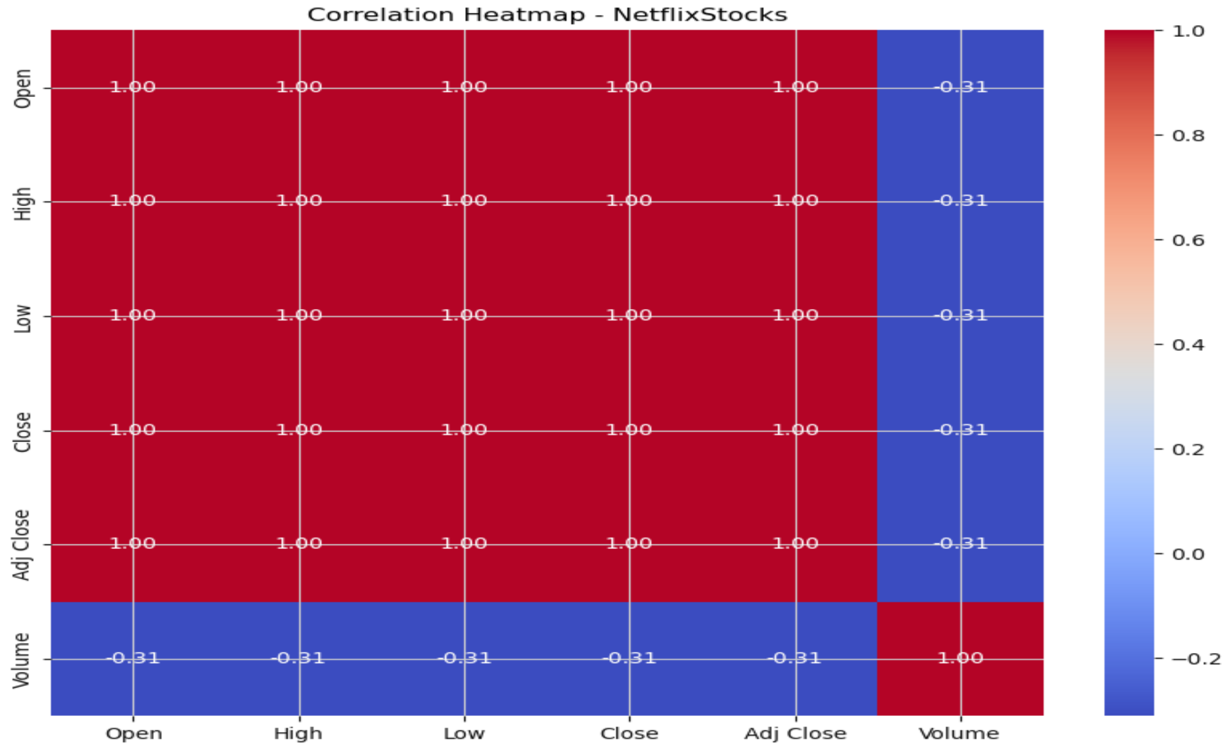
Also Line chart for the “Closing Price” over the years were plotted. So we can compare how much a stock has been increased over the years.



26/12/2024: Candlestick graph plotting and Heatmap

I have always been a enthusiastic person for stocks trading, hence I know that candlestick graphs are the most accurate and best visualization for any stocks. So I researched about plotting candlestick graphs for datasets, and with the help of brainstorming of teammates and google search, I came across “mplfinance” module, which allows us to plot the candlestick graphs for the datasets. Hence I collected the syntax and applied for our dataset and got the candlestick graph.





28/12/2024: ML Algorithms application

This was the main and the difficult part of our project, where our team needs to decide what ML algorithms we should use and what is the best option for stock predictions. So we decided that each member will work on different ML Algorithms, will get the output results and graphs and then the best algorithm will be picked.

So Shravani decided to work with Linear Regression model, Hitesh decided to work on RandomForestClassifier, Kshitij decided to work on LSTM model. And I decided to work on prophet model.

So First I transformed the data using MinMaxScaler, so that our ML algorithm works best. Once the scaling is done. I did splitting of the dataset into training and testing. As the stock prediction is highly complex topic, we need to train the model with more data. Hence I decided to split the data into 80% training and 20% testing.

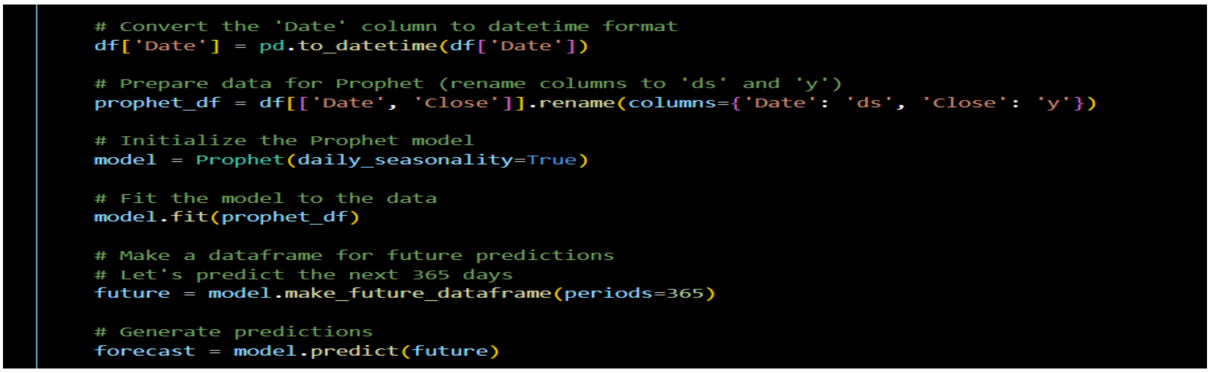
29/12/2024: Multiple error in code

I was not having idea on how to use prophet model and how it works. So I decided to go through the module prophet and understand the concept. Prophet is an additive model-based method for time series data forecasting that fits non-linear trends with daily, weekly, and annual seasonality as well as holiday impacts. It is most effective when applied to time series with multiple seasons of historical data and significant seasonal influences. Prophet usually manages outliers effectively and is resilient to missing data and trend changes.

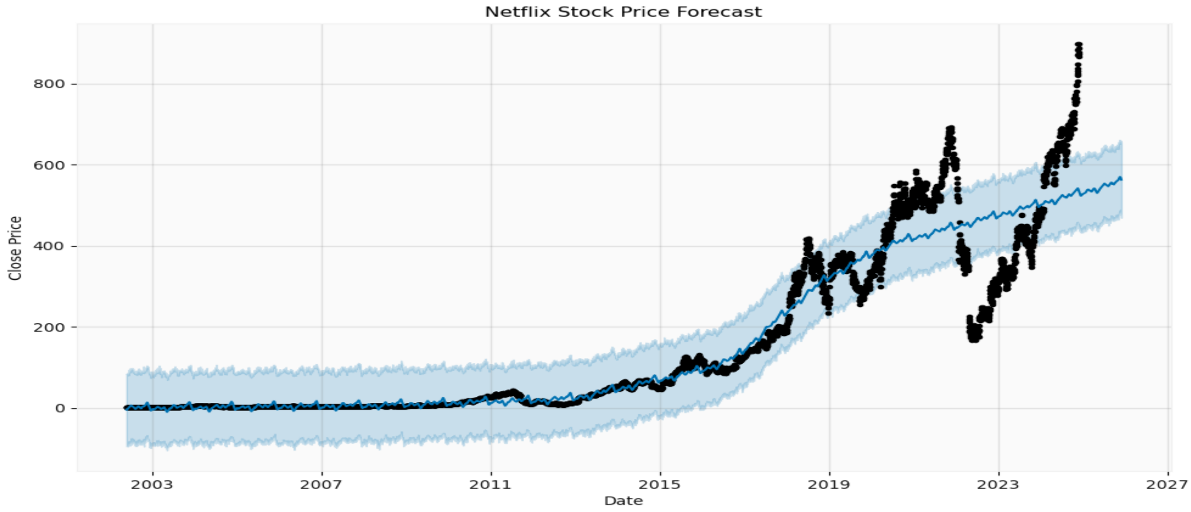
After understanding the prophet model, I got the syntax for this ML model from python official website. But got some errors while implementing it to my dataset. Then I came to knew that we have to do some datetime conversions and then proceed. So I referred some youtube videos, where they used prophet model on some dataset. And then I tried replicating the same for my dataset and it worked.

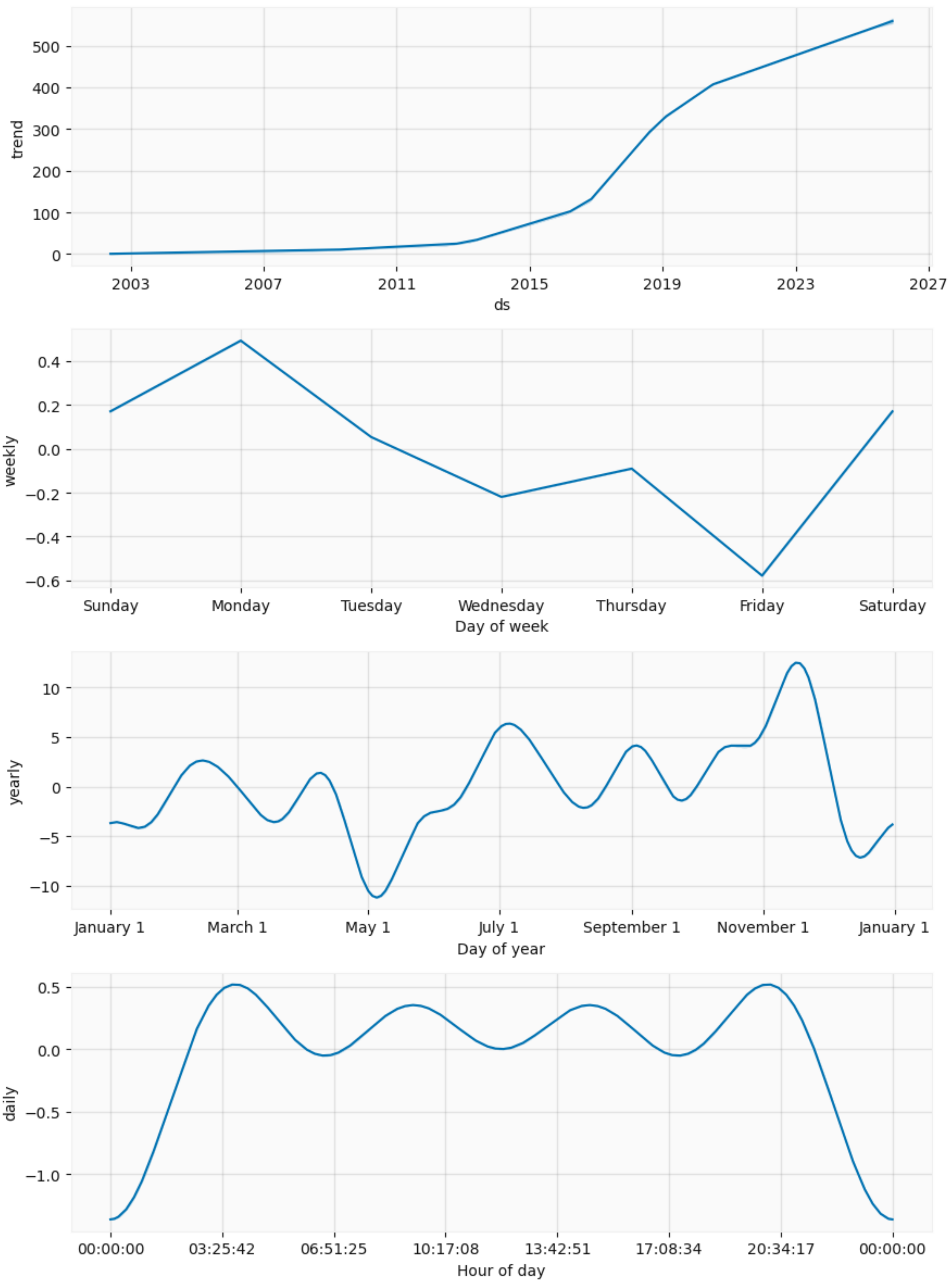
So I updated my dataframe accordingly and trained my model on this dataframe, and used “make_future_dataframe” which is inbuilt function of this prophet model, which gives us the prediction of future stock values and creates a new dataframe which predicts the stock prices for the next year.

Some graphs for the predicted trends were plotted and a new csv file will be saved which has the future trends and predictions.



```
# Convert the 'Date' column to datetime format
df['Date'] = pd.to_datetime(df['Date'])

# Prepare data for Prophet (rename columns to 'ds' and 'y')
prophet_df = df[['Date', 'Close']].rename(columns={'Date': 'ds', 'Close': 'y'})

# Initialize the Prophet model
model = Prophet(daily_seasonality=True)

# Fit the model to the data
model.fit(prophet_df)

# Make a dataframe for future predictions
# Let's predict the next 365 days
future = model.make_future_dataframe(periods=365)

# Generate predictions
forecast = model.predict(future)
```




trend
500
400
300
200
100
0
2003
2007
2011
2015
2019
2023
2027
ds
weekly
0.4
0.2
0.0
−0.2
−0.4
−0.6
Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Day of week
yearly
10
5
0
−5
−10
January 1
March 1
May 1
July 1
September 1
November 1
January 1
Day of year
daily
0.5
0.0
−0.5
−1.0
00:00:00
03:25:42
06:51:25
10:17:08
13:42:51
17:08:34
20:34:17
00:00:00
Hour of day

02/01/2025: Working on PPT and report:

Everyone was ready with the code and outputs, but we decided to select best models which has better accuracy and predictions. Now we all knew what models were applied and which was the better working models. Hence we decided to work on report and ppt.

Everyone shared their inputs and research papers which they used over this period. And Shravani and Hitesh acted as a bridge between all 4 of us and decided to work on the report, they collected information from all of us and started working on the report parts like Introduction abstract and literature review. Meanwhile Kshitij and me were working on methodology and results part. Where we shared all the necessary details of the methodologies so that they can append in the report.

03/01/2025: PPT

Presentation slides which involves the important points and highlights from the project was made by me and Hitesh. All the slides were added and necessary key points were highlighted.

04/01/2025: Report and ppt finalization:

Once the report and ppt were ready, we all sat together to review all the work. Checked grammar mistakes and alignments. Once it was done. We went with cleaning the report wherever it was required.

05/01/2025: Aligning the code so that every dataset selected has been operated with similar techniques

Once the report and ppt were ready. We decided that all the datasets used, must be aligned and same set of operations should be applied, so that there will be clarity of all the operations done and algorithms applied. And also the main reason for this is that the person who will check the code should understand and co-relate all the datasets and results.

Also we all uploaded the necessary files to the github and the link was added. Hitesh and Kshitij helped with the instructions file and README file.

06/01/2025: Video presentation

All the team members did a teams call and I shared my screen and we started explaining the code and concept of our project. We also gave a demo by running the code.