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INTELLIGENT SYSTEMS – COS30018

REPORT TASK-B.3 (OPTION-B STOCK PREDICTION SYSTEM)

INTRODUCTION

In this task, we have modified the code to present the data in the form of candlestick charts and the boxplot charts. In the existing codes, we have made changes and introduced new function to execute the codes with the outputs as expected according to the task requirements. These visualizations are used to understand stock price movements and the distribution of adjusted close prices over time.

The primary objective of this task is to enhance the stock prediction project by incorporating effective data visualization techniques. The visualizations aim to:

- Provide a detailed view of historical stock price movements using candlestick charts.
- Analyse the distribution of adjusted close prices using boxplot charts.

Tools and Libraries

- **Python:** Programming language used for data processing and visualization.
- **Pandas:** Library for data manipulation and analysis.
- **Matplotlib:** Library for creating static, animated, and interactive visualizations in Python.
- **mplfinance:** Library specifically designed for financial data visualization, particularly candlestick charts.
- **Yahoo Finance:** Source for stock data.

CANDLESTICK CHARTS

The 'plot_candlestick_chart' function generates a candlestick chart to visualize stock price movements over a specified number of days. It plots the candlestick chart using the 'mplfinance' library.

Explanation:

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Resample the Data:

`df.resample(f'{n_days}D')`: The DataFrame is resampled to re-aggregate data over a period of `n_days` days.

`.agg({...})`: Within every period, aggregates data as follows:

'open': "first": For each period, the opening price.
'high': "max": During the period, the highest price recorded.
'low': "min": The lowest pricing in that duration.
'adjclose': "last": For each period, the closing price.
'volume': "sum": Total trading volume within that period.
Rename Columns:

`df_resampled.rename({...}, inplace=True)`: The columns are renamed to meet mplfinance library's naming convention:

From 'open' to 'Open'

From 'high' to 'High'

From 'low' to 'Low'

From 'adjclose' to 'Close'

From 'volume' to 'Volume'

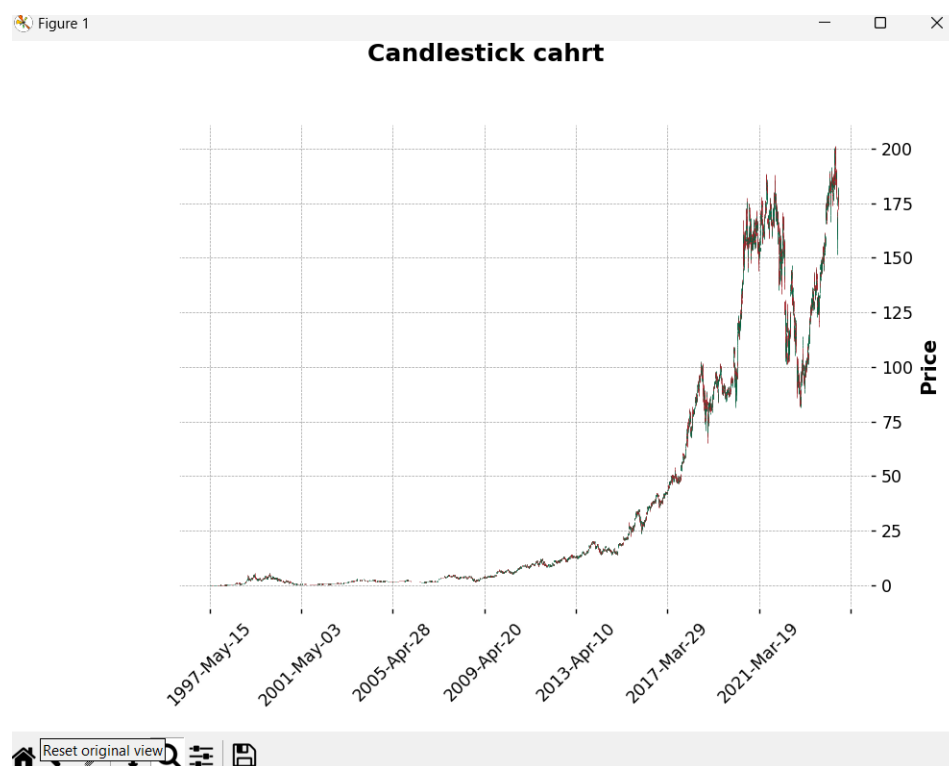
Drop Missing Values:

`df_resampled.dropna(inplace=True)`: Remove rows with missing values so that there is a clean data set to plot.

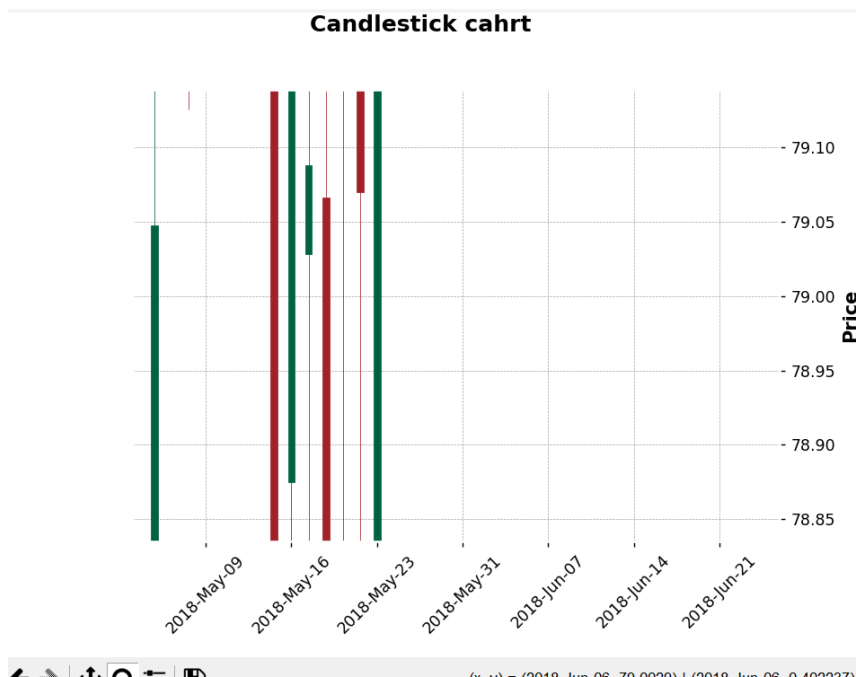
Plot the Data:

`mpf.plot(...)`: It uses the mplfinance library for creating and showing a candlestick chart of the specified style, title, and y-axis label.

Result output-



This is the initial view for the output of the candlestick chart. But, below is the zoomed-in view of the chart in which the candlesticks are clearly visible.



BOXPLOT CHART

Explanation:

1. Confirm DateTime Index:

o if not isinstance(df.index, pd.DatetimeIndex): It basically checks if the DataFrame index is of DateTime index or not.

o df.index = pd.to_datetime(df.index): Converts it to date-time format whenever necessary for proper resampling.

2. Resample and Aggregate Data:

o df.resample(f"{n_days}D"): Resamples the DataFrame to aggregate data into periods of n_days days.

o .agg({...}): Calculates summary statistics for the adjclose column:

♣ 'min': Minimum adjusted close price.

♣ '25%': 25th percentile (lower quartile).

♣ '50%': 50th percentile (median).

♣ '75%': 75th percentile (upper quartile).

♣ 'max': Maximum adjusted close price.

3. Drop Missing Values:

o df_resampled.dropna(inplace=True): Remove rows with NaN values to ensure clean data.

4. Prepare Data for Plotting:

o boxplot_data = [...]: Extracts values of summary statistics in order to prepare the boxplot.

5. Plot the Data:

o plt.figure(figsize=(12, 6)): Sets size of figure for the plot.

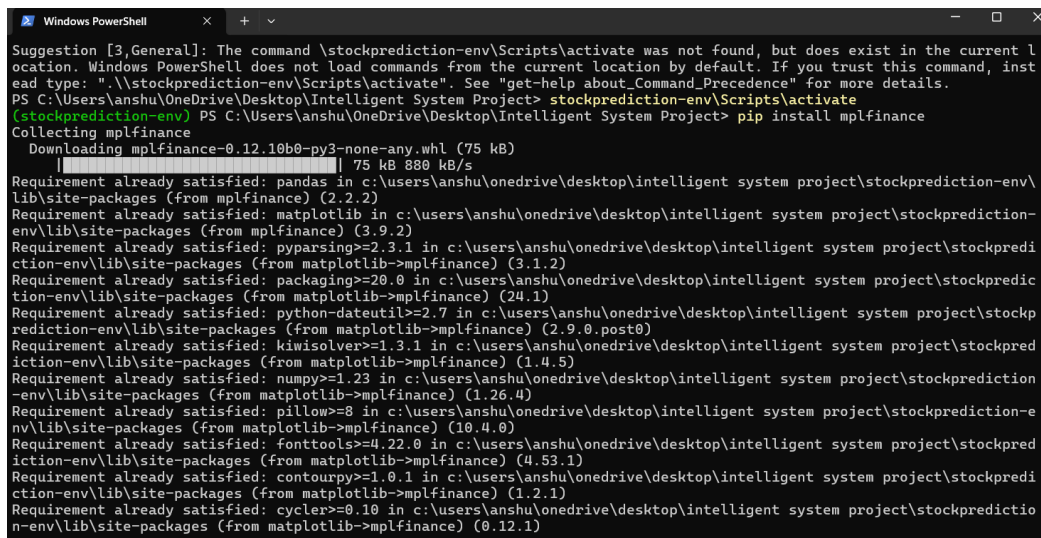
o plt.boxplot(boxplot_data, labels=[f'{n_days} Days']): Create a boxplot using prepared data and labels on it.

o plt.title(...), plt.ylabel(...), plt.xlabel(...): Sets the title, y-axis label, x-axis label for the plot respectively.

o plt.savefig('boxplot_chart.png'): Saves plot as a PNG file format lastly.

o plt.close(): Closing will free up resources by closing this plot.

LIBRARIES INSTALLED – In order to make candlestick charts, we have to install one more library named as “mplfinance”. Below is the screenshot –



```
Windows PowerShell
Suggestion [3,General]: The command stockprediction-env\Scripts\activate was not found, but does exist in the current location. Windows PowerShell does not load commands from the current location by default. If you trust this command, instead type: ".\stockprediction-env\Scripts\activate". See "get-help about_Command_Precedence" for more details.
PS C:\Users\anshu\OneDrive\Desktop\Intelligent System Project> stockprediction-env\Scripts\activate
(stockprediction-env) PS C:\Users\anshu\OneDrive\Desktop\Intelligent System Project> pip install mplfinance
Collecting mplfinance
  Downloading mplfinance-0.12.10b0-py3-none-any.whl (75 kB)
    | 75 kB 880 kB/s
Requirement already satisfied: pandas in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from mplfinance) (2.2.2)
Requirement already satisfied: matplotlib in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from mplfinance) (3.9.2)
Requirement already satisfied: pyparsing>=2.3.1 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (3.1.2)
Requirement already satisfied: packaging>=20.0 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (24.1)
Requirement already satisfied: python-dateutil>=2.7 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (2.9.0.post0)
Requirement already satisfied: kiwisolver>=1.3.1 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (1.4.5)
Requirement already satisfied: numpy>=1.23 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (1.26.4)
Requirement already satisfied: pillow>=8 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (10.4.0)
Requirement already satisfied: fonttools>=4.22.0 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (4.53.1)
Requirement already satisfied: contourpy>=1.0.1 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (1.2.1)
Requirement already satisfied: cycler>=0.10 in c:\users\anshu\onedrive\desktop\intelligent system project\stockprediction-env\lib\site-packages (from matplotlib->mplfinance) (0.12.1)
```

Problems –

Boxplot not displayed:

The boxplot chart failed to appear even though the coding was right. Even though, still we have not got the boxplot in the output. In this case, I have also taken help from the AI tools to really know the reason while not having the figure of the boxplot but still its not solved. In order to get the output, I have made changes also like saving the image to the respective directory.

Data Volume Warning:

A warning already was gotten because of plotting too much data that could hinder visibility and details.

Possible problems with the boxplot chart:

The boxplot data aggregation and visualization methods may not have been configured or handled correctly.

A difference between actual and anticipated output:

It was confusing if it was the code or the data that led to boxplot visualization problems.

Error messages and Alerts:

Windows can be affected by unexpected behavior or notices that can affect the outputs of a picture leading to the unexpected standstill in the plots.

Tutorial was helpful in doing the task. Along with the tutorial, usage of Generative AI is also there with the purpose of learning only and some online platforms like mlforanalytics.com, Investopedia were also used.

Thank You.