

Final Assignment

July 29, 2025

Extracting and Visualizing Stock Data

Description

Extracting essential data from a dataset and displaying it is a necessary part of data science; therefore individuals can make correct decisions based on the data. In this assignment, you will extract some stock data, you will then display this data in a graph.

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Estimated Time Needed: 30 min

Note:- If you are working Locally using anaconda, please uncomment the following code and execute it. Use the version as per your python version.

```
[26]: !pip install yfinance
      !pip install bs4
      !pip install nbformat
      !pip install --upgrade plotly
      !pip install numpy
```

Requirement already satisfied: yfinance in /opt/conda/lib/python3.12/site-packages (0.2.65)

Requirement already satisfied: pandas>=1.3.0 in /opt/conda/lib/python3.12/site-packages (from yfinance) (2.3.1)

Requirement already satisfied: numpy>=1.16.5 in /opt/conda/lib/python3.12/site-packages (from yfinance) (2.3.2)

Requirement already satisfied: requests>=2.31 in /opt/conda/lib/python3.12/site-packages (from yfinance) (2.32.3)

Requirement already satisfied: multitasking>=0.0.7 in /opt/conda/lib/python3.12/site-packages (from yfinance) (0.0.12)

Requirement already satisfied: platformdirs>=2.0.0 in

/opt/conda/lib/python3.12/site-packages (from yfinance) (4.3.6)
 Requirement already satisfied: pytz>=2022.5 in /opt/conda/lib/python3.12/site-packages (from yfinance) (2024.2)
 Requirement already satisfied: frozendict>=2.3.4 in /opt/conda/lib/python3.12/site-packages (from yfinance) (2.4.6)
 Requirement already satisfied: peewee>=3.16.2 in /opt/conda/lib/python3.12/site-packages (from yfinance) (3.18.2)
 Requirement already satisfied: beautifulsoup4>=4.11.1 in /opt/conda/lib/python3.12/site-packages (from yfinance) (4.12.3)
 Requirement already satisfied: curl_cffi>=0.7 in /opt/conda/lib/python3.12/site-packages (from yfinance) (0.12.0)
 Requirement already satisfied: protobuf>=3.19.0 in /opt/conda/lib/python3.12/site-packages (from yfinance) (6.31.1)
 Requirement already satisfied: websockets>=13.0 in /opt/conda/lib/python3.12/site-packages (from yfinance) (15.0.1)
 Requirement already satisfied: soupsieve>1.2 in /opt/conda/lib/python3.12/site-packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
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 Requirement already satisfied: certifi>=2024.2.2 in /opt/conda/lib/python3.12/site-packages (from curl_cffi>=0.7->yfinance) (2024.12.14)
 Requirement already satisfied: python-dateutil>=2.8.2 in /opt/conda/lib/python3.12/site-packages (from pandas>=1.3.0->yfinance) (2.9.0.post0)
 Requirement already satisfied: tzdata>=2022.7 in /opt/conda/lib/python3.12/site-packages (from pandas>=1.3.0->yfinance) (2025.2)
 Requirement already satisfied: charset_normalizer<4,>=2 in /opt/conda/lib/python3.12/site-packages (from requests>=2.31->yfinance) (3.4.1)
 Requirement already satisfied: idna<4,>=2.5 in /opt/conda/lib/python3.12/site-packages (from requests>=2.31->yfinance) (3.10)
 Requirement already satisfied: urllib3<3,>=1.21.1 in /opt/conda/lib/python3.12/site-packages (from requests>=2.31->yfinance) (2.3.0)
 Requirement already satisfied: pycparser in /opt/conda/lib/python3.12/site-packages (from cffi>=1.12.0->curl_cffi>=0.7->yfinance) (2.22)
 Requirement already satisfied: six>=1.5 in /opt/conda/lib/python3.12/site-packages (from python-dateutil>=2.8.2->pandas>=1.3.0->yfinance) (1.17.0)
 Requirement already satisfied: bs4 in /opt/conda/lib/python3.12/site-packages (0.0.2)
 Requirement already satisfied: beautifulsoup4 in /opt/conda/lib/python3.12/site-packages (from bs4) (4.12.3)
 Requirement already satisfied: soupsieve>1.2 in /opt/conda/lib/python3.12/site-packages (from beautifulsoup4->bs4) (2.5)
 Requirement already satisfied: nbformat in /opt/conda/lib/python3.12/site-packages (5.10.4)
 Requirement already satisfied: fastjsonschema>=2.15 in /opt/conda/lib/python3.12/site-packages (from nbformat) (2.21.1)
 Requirement already satisfied: jsonschema>=2.6 in

```

/opt/conda/lib/python3.12/site-packages (from nbformat) (4.23.0)
Requirement already satisfied: jupyter-core!=5.0.*,>=4.12 in
/opt/conda/lib/python3.12/site-packages (from nbformat) (5.7.2)
Requirement already satisfied: traitlets>=5.1 in /opt/conda/lib/python3.12/site-
packages (from nbformat) (5.14.3)
Requirement already satisfied: attrs>=22.2.0 in /opt/conda/lib/python3.12/site-
packages (from jsonschema>=2.6->nbformat) (25.1.0)
Requirement already satisfied: jsonschema-specifications>=2023.03.6 in
/opt/conda/lib/python3.12/site-packages (from jsonschema>=2.6->nbformat)
(2024.10.1)
Requirement already satisfied: referencing>=0.28.4 in
/opt/conda/lib/python3.12/site-packages (from jsonschema>=2.6->nbformat)
(0.36.2)
Requirement already satisfied: rpds-py>=0.7.1 in /opt/conda/lib/python3.12/site-
packages (from jsonschema>=2.6->nbformat) (0.22.3)
Requirement already satisfied: platformdirs>=2.5 in
/opt/conda/lib/python3.12/site-packages (from jupyter-
core!=5.0.*,>=4.12->nbformat) (4.3.6)
Requirement already satisfied: typing-extensions>=4.4.0 in
/opt/conda/lib/python3.12/site-packages (from
referencing>=0.28.4->jsonschema>=2.6->nbformat) (4.12.2)
Requirement already satisfied: plotly in /opt/conda/lib/python3.12/site-packages
(6.2.0)
Requirement already satisfied: narwhals>=1.15.1 in
/opt/conda/lib/python3.12/site-packages (from plotly) (2.0.1)
Requirement already satisfied: packaging in /opt/conda/lib/python3.12/site-
packages (from plotly) (24.2)
Requirement already satisfied: numpy in /opt/conda/lib/python3.12/site-packages
(2.3.2)

```

```

[4]: import yfinance as yf
import pandas as pd
import requests
from bs4 import BeautifulSoup
import plotly.graph_objects as go
from plotly.subplots import make_subplots

```

```

[5]: import plotly.io as pio
pio.renderers.default = "iframe"

```

In Python, you can ignore warnings using the warnings module. You can use the filterwarnings function to filter or ignore specific warning messages or categories.

```

[6]: import warnings
# Ignore all warnings
warnings.filterwarnings("ignore", category=FutureWarning)

```

0.1 Define Graphing Function

In this section, we define the function `make_graph`. You don't have to know how the function works, you should only care about the inputs. It takes a dataframe with stock data (dataframe must contain `Date` and `Close` columns), a dataframe with revenue data (dataframe must contain `Date` and `Revenue` columns), and the name of the stock.

```
[ ]: def make_graph(stock_data, revenue_data, stock):
    fig = make_subplots(rows=2, cols=1, shared_xaxes=True,
        subplot_titles=("Historical Share Price", "Historical Revenue"),
        vertical_spacing = .3)
    stock_data_specific = stock_data[stock_data.Date <= '2021-06-14']
    revenue_data_specific = revenue_data[revenue_data.Date <= '2021-04-30']
    fig.add_trace(go.Scatter(x=pd.to_datetime(stock_data_specific.Date,
        infer_datetime_format=True), y=stock_data_specific.Close.astype("float"),
        name="Share Price"), row=1, col=1)
    fig.add_trace(go.Scatter(x=pd.to_datetime(revenue_data_specific.Date,
        infer_datetime_format=True), y=revenue_data_specific.Revenue.
        astype("float"), name="Revenue"), row=2, col=1)
    fig.update_xaxes(title_text="Date", row=1, col=1)
    fig.update_xaxes(title_text="Date", row=2, col=1)
    fig.update_yaxes(title_text="Price ($US)", row=1, col=1)
    fig.update_yaxes(title_text="Revenue ($US Millions)", row=2, col=1)
    fig.update_layout(showlegend=False,
        height=900,
        title=stock,
        xaxis_rangeslider_visible=True)
    fig.show()
    from IPython.display import display, HTML
    fig_html = fig.to_html()
    display(HTML(fig_html))
```

Use the `make_graph` function that we've already defined. You'll need to invoke it in questions 5 and 6 to display the graphs and create the dashboard. > **Note: You don't need to redefine the function for plotting graphs anywhere else in this notebook; just use the existing function.**

0.2 Question 1: Use yfinance to Extract Stock Data

Using the `Ticker` function enter the ticker symbol of the stock we want to extract data on to create a ticker object. The stock is Tesla and its ticker symbol is `TSLA`.

```
[7]: tesla=yf.Ticker("TSLA")
```

Using the ticker object and the function `history` extract stock information and save it in a dataframe named `tesla_data`. Set the `period` parameter to `"max"` so we get information for the maximum amount of time.

```
[8]: tesla_data=tesla.history(period="max")
```

Reset the index using the `reset_index(inplace=True)` function on the `tesla_data` DataFrame and display the first five rows of the `tesla_data` dataframe using the `head` function. Take a screenshot of the results and code from the beginning of Question 1 to the results below.

```
[9]: tesla_data.reset_index(inplace=True)
tesla_data.head(5)
```

```
[9]:
```

	Date	Open	High	Low	Close	\
0	2010-06-29 00:00:00-04:00	1.266667	1.666667	1.169333	1.592667	
1	2010-06-30 00:00:00-04:00	1.719333	2.028000	1.553333	1.588667	
2	2010-07-01 00:00:00-04:00	1.666667	1.728000	1.351333	1.464000	
3	2010-07-02 00:00:00-04:00	1.533333	1.540000	1.247333	1.280000	
4	2010-07-06 00:00:00-04:00	1.333333	1.333333	1.055333	1.074000	

	Volume	Dividends	Stock Splits
0	281494500	0.0	0.0
1	257806500	0.0	0.0
2	123282000	0.0	0.0
3	77097000	0.0	0.0
4	103003500	0.0	0.0

0.3 Question 2: Use Webscraping to Extract Tesla Revenue Data

Use the `requests` library to download the webpage <https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/revenue.htm> Save the text of the response as a variable named `html_data`.

```
[ ]: import pandas as pd
import requests
from bs4 import BeautifulSoup
url= "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
↳IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/revenue.htm"
response=requests.get(url)
html_data=response.text
print(html_data)
```

Parse the html data using `beautiful_soup` using parser i.e `html5lib` or `html.parser`.

```
[45]: soup = BeautifulSoup(html_data, 'html.parser')
```

Using `BeautifulSoup` or the `read_html` function extract the table with **Tesla Revenue** and store it into a dataframe named `tesla_revenue`. The dataframe should have columns **Date** and **Revenue**.

Step-by-step instructions

Here are the step-by-step instructions:

1. Create an Empty DataFrame

2. Find the Relevant Table
3. Check for the Tesla Quarterly Revenue Table
4. Iterate Through Rows in the Table Body
5. Extract Data from Columns
6. Append Data to the DataFrame

Click [here](#) if you need help locating the table

Below is the code to isolate the table, you will now need to loop through the rows and columns

```
soup.find_all("tbody")[1]
```

If you want to use the `read_html` function the table is located at index 1

We are focusing on quarterly revenue in the lab.

```
[55]: !pip install lxml
import pandas as pd
from bs4 import BeautifulSoup
import requests
from io import StringIO
soup = BeautifulSoup(html_data, 'html.parser')
tables = pd.read_html(str(soup))
tesla_revenue = tables[1].copy()
tesla_revenue.columns = ['Date', 'Revenue']
tesla_revenue = tesla_revenue.dropna()
tesla_revenue.reset_index(drop=True, inplace=True)
```

Requirement already satisfied: lxml in /opt/conda/lib/python3.12/site-packages (6.0.0)

Execute the following line to remove the comma and dollar sign from the Revenue column.

```
[56]: tesla_revenue["Revenue"] = tesla_revenue['Revenue'].str.
      ↪replace(',', '\\$', "", regex=True)
```

Execute the following lines to remove an null or empty strings in the Revenue column.

```
[57]: tesla_revenue.dropna(inplace=True)

tesla_revenue = tesla_revenue[tesla_revenue['Revenue'] != ""]
```

Display the last 5 row of the `tesla_revenue` dataframe using the `tail` function. Take a screenshot of the results.

```
[58]: tesla_revenue.tail(5)
```

```
[58]:      Date Revenue
48  2010-09-30      31
49  2010-06-30      28
```

50	2010-03-31	21
51	2009-09-30	46
52	2009-06-30	27

0.4 Question 3: Use yfinance to Extract Stock Data

Using the `Ticker` function enter the ticker symbol of the stock we want to extract data on to create a ticker object. The stock is GameStop and its ticker symbol is `GME`.

```
[40]: gme_ticker=yf.Ticker("GME")
```

Using the ticker object and the function `history` extract stock information and save it in a dataframe named `gme_data`. Set the `period` parameter to `"max"` so we get information for the maximum amount of time.

```
[41]: gme_data=gme_ticker.history(period="max")
```

Reset the index using the `reset_index(inplace=True)` function on the `gme_data` DataFrame and display the first five rows of the `gme_data` dataframe using the `head` function. Take a screenshot of the results and code from the beginning of Question 3 to the results below.

```
[ ]: gme_data.reset_index(inplace=True)
      gme_data.head(5)
```

0.5 Question 4: Use Webscraping to Extract GME Revenue Data

Use the `requests` library to download the webpage <https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/stock.html>. Save the text of the response as a variable named `html_data_2`.

```
[67]: # Step 1: Import necessary libraries
import requests
from bs4 import BeautifulSoup
import pandas as pd

# Step 2: Download the webpage
url = "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
↳IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/stock.html"
html_data_2 = requests.get(url).text

# Step 3: Parse the HTML
soup = BeautifulSoup(html_data_2, "html.parser") # or "html5lib"

# Step 4: Extract all tables
tables = pd.read_html(str(soup))

# Step 5: Locate the table containing "GameStop Revenue"
for table in tables:
```

```

    if "GameStop" in table.columns[0]: # Checks if the first column header
        contains "GameStop"
        gme_revenue = table
        break

# Step 6: Clean the dataframe
gme_revenue.columns = ["Date", "Revenue"]
gme_revenue["Revenue"] = gme_revenue["Revenue"].str.replace("$", "").str.
    replace(",", "")
gme_revenue = gme_revenue[gme_revenue["Revenue"] != ""] # Remove empty strings
gme_revenue["Revenue"] = pd.to_numeric(gme_revenue["Revenue"]) # Convert to
    numeric

# Step 7: Display the last 5 rows

```

```

[67]:
   Date  Revenue
11  2009     8806
12  2008     7094
13  2007     5319
14  2006     3092
15  2005     1843

```

Parse the html data using `beautiful_soup` using parser i.e `html5lib` or `html.parser`.

[]:

Using `BeautifulSoup` or the `read_html` function extract the table with `GameStop Revenue` and store it into a dataframe named `gme_revenue`. The dataframe should have columns `Date` and `Revenue`. Make sure the comma and dollar sign is removed from the `Revenue` column.

Note: Use the method similar to what you did in question 2.

[Click here](#) if you need help locating the table

Below is the code to isolate the table, you will now need to loop through the rows and columns

```
soup.find_all("tbody")[1]
```

If you want to use the `read_html` function the table is located at index 1

[]:

Display the last five rows of the `gme_revenue` dataframe using the `tail` function. Take a screenshot of the results.

```
[68]: gme_revenue.tail()
```



```
[68]:
```

	Date	Revenue
11	2009	8806
12	2008	7094
13	2007	5319
14	2006	3092
15	2005	1843

0.6 Question 5: Plot Tesla Stock Graph

Use the `make_graph` function to graph the Tesla Stock Data, also provide a title for the graph. Note the graph will only show data upto June 2021.

Hint

You just need to invoke the `make_graph` function with the required parameter to print the graph.

```
[64]: import matplotlib.pyplot as plt

def make_graph(stock_data, revenue_data, stock):
    # Convert 'Date' columns to datetime
    stock_data['Date'] = pd.to_datetime(stock_data['Date'])
    revenue_data['Date'] = pd.to_datetime(revenue_data['Date'])

    # Filter data up to June 2021
    stock_data = stock_data[stock_data['Date'] <= '2021-06-30']
    revenue_data = revenue_data[revenue_data['Date'] <= '2021-06-30']

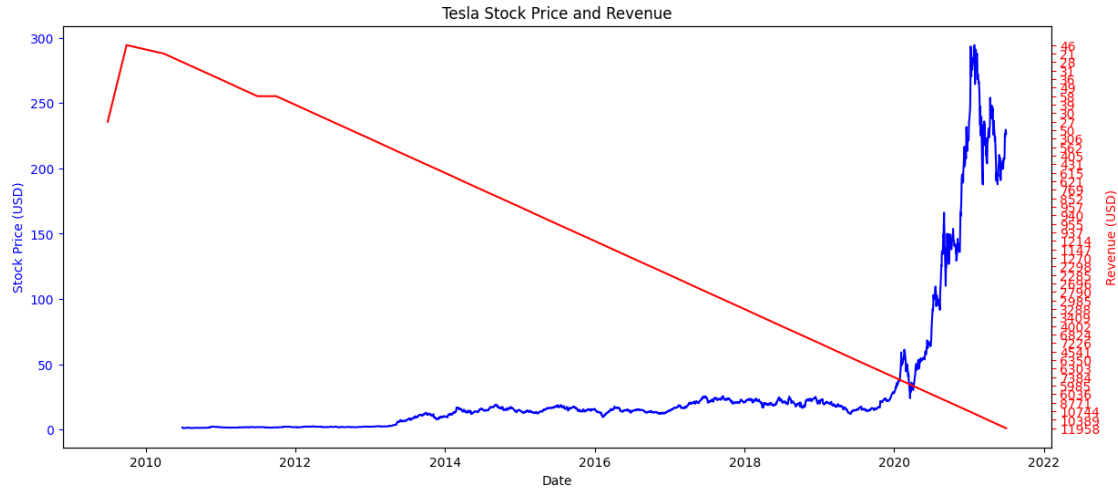
    # Create the plot
    fig, ax1 = plt.subplots(figsize=(14, 6))

    # Plot stock prices
    ax1.plot(stock_data['Date'], stock_data['Close'], 'b-', label='Stock Price')
    ax1.set_xlabel('Date')
    ax1.set_ylabel('Stock Price (USD)', color='b')
    ax1.tick_params('y', colors='b')
    ax1.set_title(f"{stock} Stock Price and Revenue")

    # Plot revenue on secondary y-axis
    ax2 = ax1.twinx()
    ax2.plot(revenue_data['Date'], revenue_data['Revenue'], 'r-',
    label='Revenue')
    ax2.set_ylabel('Revenue (USD)', color='r')
    ax2.tick_params('y', colors='r')

    plt.show()
```

```
[65]: make_graph(tesla_data, tesla_revenue, 'Tesla')
```



0.7 Question 6: Plot GameStop Stock Graph

Use the `make_graph` function to graph the GameStop Stock Data, also provide a title for the graph. The structure to call the `make_graph` function is `make_graph(gme_data, gme_revenue, 'GameStop')`. Note the graph will only show data upto June 2021.

Hint

You just need to invoke the `make_graph` function with the required parameter to print the graph.

```
[69]: make_graph(gme_data, gme_revenue, 'GameStop')
```



About the Authors:

Joseph Santarcangelo has a PhD in Electrical Engineering, his research focused on using machine learning, signal processing, and computer vision to determine how videos impact human cognition. Joseph has been working for IBM since he completed his PhD.

Azim Hirjani

0.8 Change Log

Date (YYYY-MM-DD)	Version	Changed By	Change Description
2022-02-28	1.2	Lakshmi Holla	Changed the URL of GameStop
2020-11-10	1.1	Malika Singla	Deleted the Optional part
2020-08-27	1.0	Malika Singla	Added lab to GitLab

##

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