

# Final Assignment

January 16, 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.

### Table of Contents

- <li>Define a Function that Makes a Graph</li>
- <li>Question 1: Use yfinance to Extract Stock Data</li>
- <li>Question 2: Use Webscraping to Extract Tesla Revenue Data</li>
- <li>Question 3: Use yfinance to Extract Stock Data</li>
- <li>Question 4: Use Webscraping to Extract GME Revenue Data</li>
- <li>Question 5: Plot Tesla Stock Graph</li>
- <li>Question 6: Plot GameStop Stock Graph</li>

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.

```
[4]: !pip install yfinance
      !pip install bs4
      !pip install nbformat
```

```
Requirement already satisfied: yfinance in /opt/conda/lib/python3.12/site-
packages (0.2.51)
Requirement already satisfied: pandas>=1.3.0 in /opt/conda/lib/python3.12/site-
packages (from yfinance) (2.2.3)
Requirement already satisfied: numpy>=1.16.5 in /opt/conda/lib/python3.12/site-
packages (from yfinance) (2.2.1)
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) (0.0.11)
Requirement already satisfied: lxml>=4.9.1 in /opt/conda/lib/python3.12/site-
packages (from yfinance) (5.3.0)
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) (3.17.8)  
 Requirement already satisfied: beautifulsoup4>=4.11.1 in /opt/conda/lib/python3.12/site-packages (from yfinance) (4.12.3)  
 Requirement already satisfied: html5lib>=1.1 in /opt/conda/lib/python3.12/site-packages (from yfinance) (1.1)  
 Requirement already satisfied: soupsieve>1.2 in /opt/conda/lib/python3.12/site-packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)  
 Requirement already satisfied: six>=1.9 in /opt/conda/lib/python3.12/site-packages (from html5lib>=1.1->yfinance) (1.17.0)  
 Requirement already satisfied: webencodings in /opt/conda/lib/python3.12/site-packages (from html5lib>=1.1->yfinance) (0.5.1)  
 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) (2024.2)  
 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: certifi>=2017.4.17 in /opt/conda/lib/python3.12/site-packages (from requests>=2.31->yfinance) (2024.12.14)  
 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) (24.3.0)
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)
(0.35.1)
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)

```

```

[5]: 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

```

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.

```

[7]: 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_rangeflider_visible=True)
fig.show()
```

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`.

```
[8]: TSLA = 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.

```
[9]: tesla_data = TSLA.history(period = "max")
tesla_data.head()
```

```
[9]:
```

	Open	High	Low	Close	Volume \
Date					
2010-06-29 00:00:00-04:00	1.266667	1.666667	1.169333	1.592667	281494500
2010-06-30 00:00:00-04:00	1.719333	2.028000	1.553333	1.588667	257806500
2010-07-01 00:00:00-04:00	1.666667	1.728000	1.351333	1.464000	123282000
2010-07-02 00:00:00-04:00	1.533333	1.540000	1.247333	1.280000	77097000
2010-07-06 00:00:00-04:00	1.333333	1.333333	1.055333	1.074000	103003500

	Dividends	Stock Splits
Date		
2010-06-29 00:00:00-04:00	0.0	0.0
2010-06-30 00:00:00-04:00	0.0	0.0
2010-07-01 00:00:00-04:00	0.0	0.0
2010-07-02 00:00:00-04:00	0.0	0.0
2010-07-06 00:00:00-04:00	0.0	0.0

**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.

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

```
[11]:
```

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

```
[12]: url = "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
↳IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/revenue.htm"
data = requests.get(url).text
```

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

```
[13]: soup_data = BeautifulSoup(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.

```
[14]: tesla_revenue = pd.DataFrame(columns = ["Date", "Revenue"])
      for row in soup_data.find("tbody").find_all("tr"):
          col = row.find_all("td")
          date = col[0].text
          revenue = col[1].text.strip().replace("$", "").replace(",", "")
          tesla_revenue = pd.concat([tesla_revenue, pd.DataFrame({"Date": [date],
          ↪ "Revenue": [revenue]})], ignore_index = True)

      tesla_revenue.head()
```

```
[14]:   Date Revenue
0  2021    53823
1  2020    31536
2  2019    24578
3  2018    21461
4  2017    11759
```

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

```
[15]: tesla_revenue["Revenue"] = tesla_revenue['Revenue'].str.replace(',|\$', "")
```

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

```
[16]: 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.

```
[17]: tesla_revenue.tail()
```

```
[17]:   Date Revenue
8  2013    2013
9  2012     413
10 2011     204
11 2010     117
12 2009     112
```

#### 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`.

```
[18]: gme = 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.

```
[19]: gme_data = gme.history(period = "max")
      gme_data.head()
```

```
[19]:
```

	Open	High	Low	Close	Volume \
Date					
2002-02-13 00:00:00-05:00	1.620129	1.693350	1.603296	1.691667	76216000
2002-02-14 00:00:00-05:00	1.712707	1.716074	1.670626	1.683250	11021600
2002-02-15 00:00:00-05:00	1.683250	1.687458	1.658002	1.674834	8389600
2002-02-19 00:00:00-05:00	1.666418	1.666418	1.578047	1.607504	7410400
2002-02-20 00:00:00-05:00	1.615920	1.662210	1.603296	1.662210	6892800

	Dividends	Stock Splits
Date		
2002-02-13 00:00:00-05:00	0.0	0.0
2002-02-14 00:00:00-05:00	0.0	0.0
2002-02-15 00:00:00-05:00	0.0	0.0
2002-02-19 00:00:00-05:00	0.0	0.0
2002-02-20 00:00:00-05:00	0.0	0.0

**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.

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

```
[20]:
```

	Date	Open	High	Low	Close	Volume \
0	2002-02-13 00:00:00-05:00	1.620129	1.693350	1.603296	1.691667	76216000
1	2002-02-14 00:00:00-05:00	1.712707	1.716074	1.670626	1.683250	11021600
2	2002-02-15 00:00:00-05:00	1.683250	1.687458	1.658002	1.674834	8389600
3	2002-02-19 00:00:00-05:00	1.666418	1.666418	1.578047	1.607504	7410400
4	2002-02-20 00:00:00-05:00	1.615920	1.662210	1.603296	1.662210	6892800

	Dividends	Stock Splits
0	0.0	0.0
1	0.0	0.0
2	0.0	0.0
3	0.0	0.0
4	0.0	0.0

## 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.

```
[21]: url2 = "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
↳IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/stock.html"
html_data_2 = requests.get(url2).text
```

Parse the html data using beautiful\_soup using parser i.e html5lib or html.parser.

```
[22]: soup_data_2 = BeautifulSoup(html_data_2, "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

```
[24]: gme_revenue = pd.DataFrame(columns = ["Date", "Revenue"])
for row in soup_data_2.find("tbody").find_all("tr"):
    col = row.find_all("td")
    date = col[0].text
    revenue = col[1].text.replace("$", "").replace(",", "")
    gme_revenue = pd.concat([gme_revenue, pd.DataFrame({"Date": [date],
↳"Revenue": [revenue]})], ignore_index = True)

gme_revenue.head()
```

```
[24]:   Date  Revenue
0  2020    6466
1  2019    8285
2  2018    8547
3  2017    7965
4  2016    9364
```

Display the last five rows of the gme\_revenue dataframe using the tail function. Take a screenshot of the results.

```
[25]: gme_revenue.dropna(inplace = True)
gme_revenue = gme_revenue[gme_revenue['Revenue'] != ""]
gme_revenue.tail()
```



```
[25]:
```

	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 graphs.

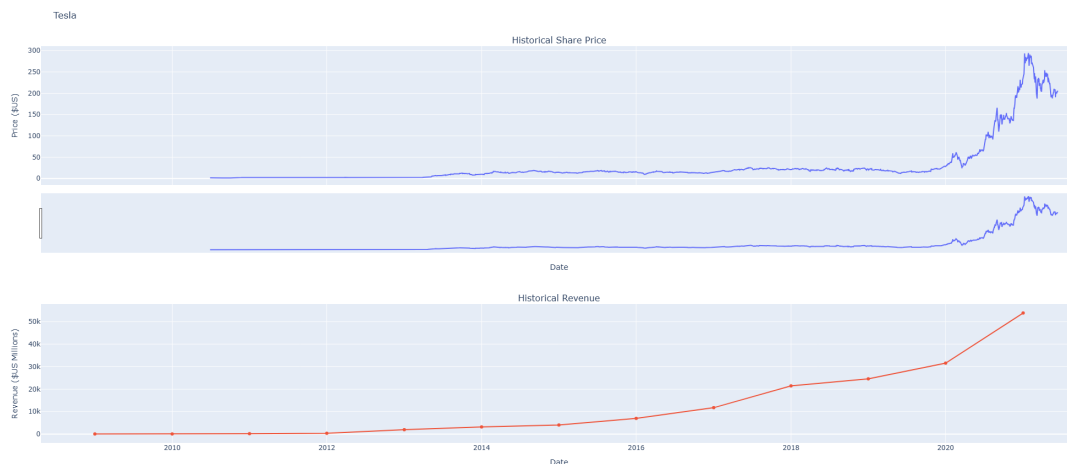
```
[52]: make_graph(tesla_data, tesla_revenue, 'Tesla')
```

```
/tmp/ipykernel_130/3316612210.py:5: UserWarning:
```

The argument 'infer\_datetime\_format' is deprecated and will be removed in a future version. A strict version of it is now the default, see <https://pandas.pydata.org/pdeps/0004-consistent-to-datetime-parsing.html>. You can safely remove this argument.

```
/tmp/ipykernel_130/3316612210.py:6: UserWarning:
```

The argument 'infer\_datetime\_format' is deprecated and will be removed in a future version. A strict version of it is now the default, see <https://pandas.pydata.org/pdeps/0004-consistent-to-datetime-parsing.html>. You can safely remove this argument.



## 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.

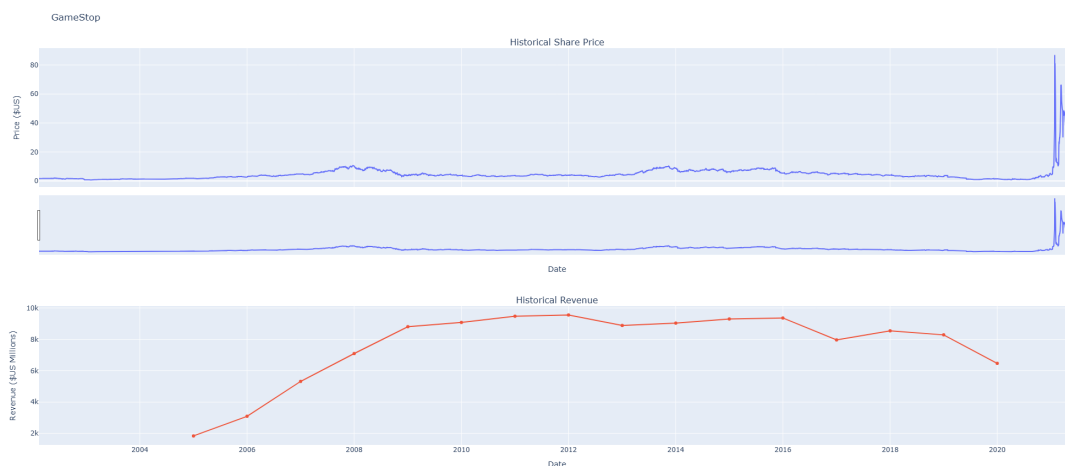
```
[46]: make_graph(gme_data, gme_revenue, 'GameStop')
```

```
/tmp/ipykernel_130/3316612210.py:5: UserWarning:
```

The argument `'infer_datetime_format'` is deprecated and will be removed in a future version. A strict version of it is now the default, see <https://pandas.pydata.org/pdeps/0004-consistent-to-datetime-parsing.html>. You can safely remove this argument.

```
/tmp/ipykernel_130/3316612210.py:6: UserWarning:
```

The argument `'infer_datetime_format'` is deprecated and will be removed in a future version. A strict version of it is now the default, see <https://pandas.pydata.org/pdeps/0004-consistent-to-datetime-parsing.html>. You can safely remove this argument.



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

##

© IBM Corporation 2020. All rights reserved.