

Final Assignment

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

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

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.

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

Collecting yfinance

Downloading yfinance-0.2.52-py2.py3-none-any.whl.metadata (5.8 kB)

Collecting pandas>=1.3.0 (from yfinance)

Downloading

pandas-2.2.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (89 kB)

Collecting numpy>=1.16.5 (from yfinance)

Downloading

numpy-2.2.2-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (62 kB)

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

Collecting multitasking>=0.0.7 (from yfinance)

Downloading multitasking-0.0.11-py3-none-any.whl.metadata (5.5 kB)
Collecting lxml>=4.9.1 (from yfinance)
Downloading lxml-5.3.0-cp312-cp312-manylinux_2_28_x86_64.whl.metadata (3.8 kB)
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)
Collecting peewee>=3.16.2 (from yfinance)
Downloading peewee-3.17.8.tar.gz (948 kB)
948.2/948.2 kB

76.7 MB/s eta 0:00:00

Installing build dependencies ... one
Getting requirements to build wheel ... done
Preparing metadata (pyproject.toml) ... done
Requirement already satisfied: beautifulsoup4>=4.11.1 in
/opt/conda/lib/python3.12/site-packages (from yfinance) (4.12.3)
Collecting html5lib>=1.1 (from yfinance)
Downloading html5lib-1.1-py2.py3-none-any.whl.metadata (16 kB)
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)
Collecting tzdata>=2022.7 (from pandas>=1.3.0->yfinance)
Downloading tzdata-2025.1-py2.py3-none-any.whl.metadata (1.4 kB)
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)
Downloading yfinance-0.2.52-py2.py3-none-any.whl (108 kB)
Downloading html5lib-1.1-py2.py3-none-any.whl (112 kB)
Downloading lxml-5.3.0-cp312-cp312-manylinux_2_28_x86_64.whl (4.9 MB)
4.9/4.9 MB

74.9 MB/s eta 0:00:00

Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)
Downloading
numpy-2.2.2-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (16.1 MB)

16.1/16.1 MB

130.0 MB/s eta 0:00:00

Downloading

pandas-2.2.3-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (12.7 MB)

12.7/12.7 MB

124.5 MB/s eta 0:00:00

Downloading tzdata-2025.1-py2.py3-none-any.whl (346 kB)

Building wheels for collected packages: peewee

Building wheel for peewee (pyproject.toml) ... one

Created wheel for peewee:

filename=peewee-3.17.8-cp312-cp312-linux_x86_64.whl size=303769

sha256=266300d475ce44cfdcba8fdc298daa268ac66d781cfc3b67fc08e5cfab3c9d0

Stored in directory: /home/jupyterlab/.cache/pip/wheels/8f/65/34/456800445efea
fb05164fe95285c70e81ba1d96bae30f43917

Successfully built peewee

Installing collected packages: peewee, multitasking, tzdata, numpy, lxml,
html5lib, pandas, yfinance

Successfully installed html5lib-1.1 lxml-5.3.0 multitasking-0.0.11 numpy-2.2.2

pandas-2.2.3 peewee-3.17.8 tzdata-2025.1 yfinance-0.2.52

Collecting bs4

Downloading bs4-0.0.2-py2.py3-none-any.whl.metadata (411 bytes)

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)

Downloading bs4-0.0.2-py2.py3-none-any.whl (1.2 kB)

Installing collected packages: bs4

Successfully installed bs4-0.0.2

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.*,>=4.1.2->nbformat) (4.3.6)

```
[138]: 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.

```
[139]: 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.**

```
[140]: 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()
```

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`.

```
[141]: 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.

```
[142]: tesla_data = tsla.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.

```
[143]: tesla_data = tesla_data.reset_index()
tesla_data.head()
```

```
[143]:
```

	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 Web scraping 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`.

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

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

```
[145] : 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.

```
[146] : tesla_revenue = pd.DataFrame(columns = ["Date", "Revenue"])
        for row in soup.find_all("tbody")[1].find_all("tr"):
            col = row.find_all("td")
            date = col[0].text
            revenue = col[1].text
            tesla_revenue = pd.concat([tesla_revenue, pd.DataFrame({"Date": [date],
                "Revenue": [revenue]}), ignore_index = True)
```

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

```
[164]: tesla_revenue["Revenue"] = tesla_revenue["Revenue"].str.replace(",", "")
        tesla_revenue["Revenue"] = tesla_revenue["Revenue"].str.replace("$", "")
```

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

```
[160]: 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.

```
[176]: print(tesla_revenue.tail())
```

	Date	Revenue
48	2010-09-30	31
49	2010-06-30	28
50	2010-03-31	21
52	2009-09-30	46
53	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.

```
[150]: 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.

```
[151]: gme_data = gme.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.

```
[152]: gme_data = gme_data.reset_index()
gme_data.head()
```

```
[152]:
```

	Date	Open	High	Low	Close	Volume \
0	2002-02-13 00:00:00-05:00	1.620128	1.693350	1.603296	1.691667	76216000
1	2002-02-14 00:00:00-05:00	1.712708	1.716074	1.670626	1.683251	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	1.615921	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 Web scraping 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.

```
[153]: url = "https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
        □IBMDDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/stock.html"

html_data_2 = requests.get(url).text
```

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

```
[168]: soup = 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

```
[173]: gme_revenue = pd.DataFrame(columns=["Date", "Revenue"])

for row in soup.find_all("tbody")[1].find_all("tr"):
    col = row.find_all("td")
    date=col[0].text
    revenue = col[1].text
    gme_revenue = pd.concat([gme_revenue, pd.DataFrame({"Date":[date],
        □"Revenue":[revenue]})], ignore_index = True)
```

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

```
[175]: gme_revenue["Revenue"] = gme_revenue["Revenue"].str.replace(",","")
gme_revenue["Revenue"] = gme_revenue["Revenue"].str.replace("$","")
gme_revenue.tail()
```

```
[175]:
```

	Date	Revenue
57	2006-01-31	1667
58	2005-10-31	534
59	2005-07-31	416
60	2005-04-30	475
61	2005-01-31	709

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

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

```
/tmp/ipykernel_131/429450962.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_131/429450962.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

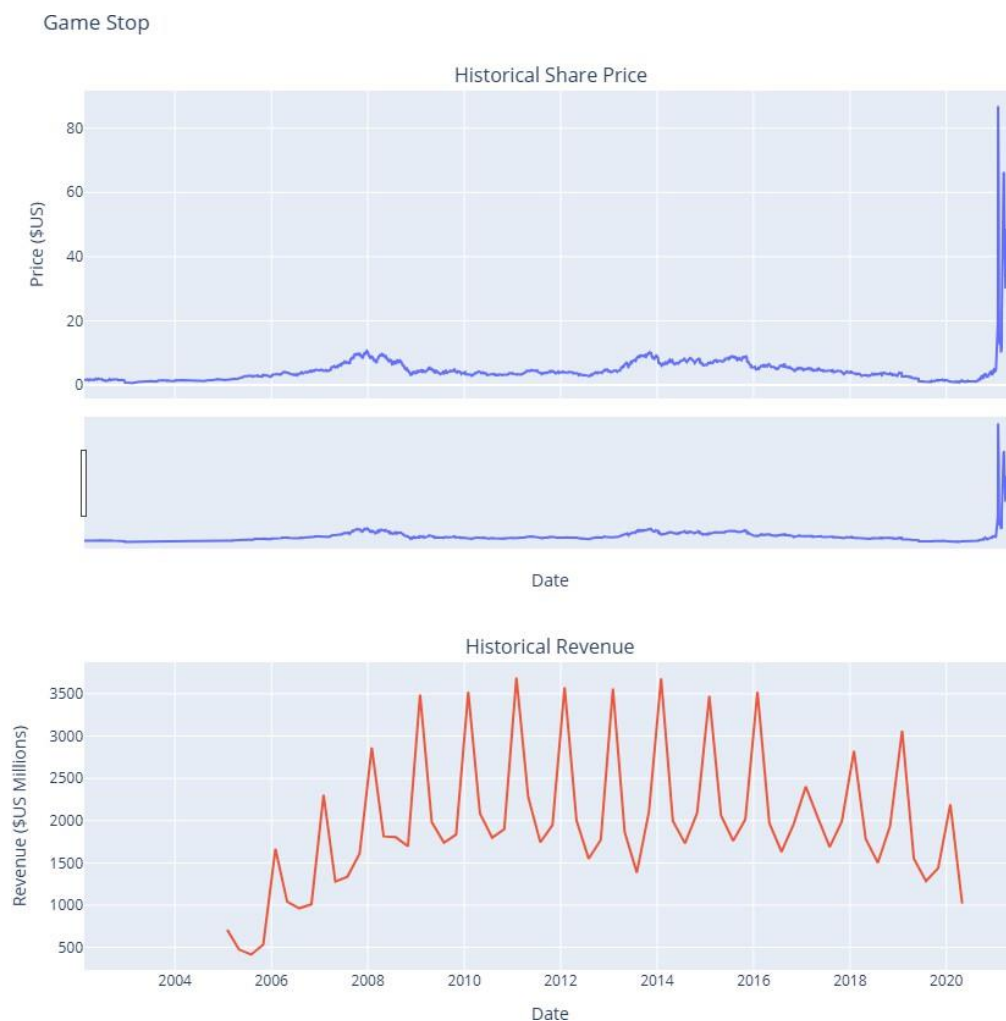
```
[178]: make_graph(gme_data, gme_revenue, 'Game Stop')
```

/tmp/ipykernel_131/429450962.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_131/429450962.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.