

Final Assignment

August 19, 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

- 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.

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

Collecting yfinance

Downloading yfinance-0.2.65-py2.py3-none-any.whl.metadata (5.8 kB)

Collecting pandas>=1.3.0 (from yfinance)

Downloading

pandas-2.3.1-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (91 kB)

Collecting numpy>=1.16.5 (from yfinance)

Downloading

numpy-2.3.2-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_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-0.0.12.tar.gz (19 kB)
  Preparing metadata (setup.py) ... done
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-3.18.2.tar.gz (949 kB)
                                949.2/949.2 kB
28.4 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 curl_cffi>=0.7 (from yfinance)
  Downloading curl_cffi-0.13.0-cp39-abi3-
manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (13 kB)
Collecting protobuf>=3.19.0 (from yfinance)
  Downloading protobuf-6.32.0-cp39-abi3-manylinux2014_x86_64.whl.metadata (593
bytes)
Collecting websockets>=13.0 (from yfinance)
  Downloading websockets-15.0.1-cp312-cp312-
manylinux_2_5_x86_64.manylinux1_x86_64.manylinux_2_17_x86_64.manylinux2014_x86_6
4.whl.metadata (6.8 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: cffi>=1.12.0 in /opt/conda/lib/python3.12/site-
packages (from curl_cffi>=0.7->yfinance) (1.17.1)
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)
Collecting tzdata>=2022.7 (from pandas>=1.3.0->yfinance)
  Downloading tzdata-2025.2-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: 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)

Downloading yfinance-0.2.65-py2.py3-none-any.whl (119 kB)

Downloading
curl_cffi-0.13.0-cp39-abi3-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (8.3 MB)

8.3/8.3 MB

157.5 MB/s eta 0:00:00

Downloading
numpy-2.3.2-cp312-cp312-manylinux_2_27_x86_64.manylinux_2_28_x86_64.whl (16.6 MB)

16.6/16.6 MB

179.5 MB/s eta 0:00:00

Downloading
pandas-2.3.1-cp312-cp312-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (12.0 MB)

12.0/12.0 MB

167.8 MB/s eta 0:00:00

Downloading protobuf-6.32.0-cp39-abi3-manylinux2014_x86_64.whl (322 kB)

Downloading websockets-15.0.1-cp312-cp312-manylinux_2_5_x86_64.manylinux1_x86_64.manylinux_2_17_x86_64.manylinux2014_x86_64.whl (182 kB)

Downloading tzdata-2025.2-py2.py3-none-any.whl (347 kB)

Building wheels for collected packages: multitasking, peewee

Building wheel for multitasking (setup.py) ... one

Created wheel for multitasking: filename=multitasking-0.0.12-py3-none-any.whl size=15605

sha256=555e49e811b3acad0c7cb11ddb38b082927dd8dc7d20d0776957dcc5d95ea3f7

Stored in directory: /home/jupyterlab/.cache/pip/wheels/cc/bd/6f/664d62c99327abeef7d86489e6631cbf45b56fbf7ef1d6ef00

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

Created wheel for peewee:
filename=peewee-3.18.2-cp312-cp312-linux_x86_64.whl size=303862

sha256=a5627797c61d6a2c131897825a39b62295d4469eb1581f6ff472884e6209fdc5

Stored in directory: /home/jupyterlab/.cache/pip/wheels/d1/df/a9/0202b051c65b11c992dd6db9f2babdd2c44ec7d35d511be5d3

Successfully built multitasking peewee

Installing collected packages: peewee, multitasking, websockets, tzdata, protobuf, numpy, pandas, curl_cffi, yfinance

Successfully installed curl_cffi-0.13.0 multitasking-0.0.12 numpy-2.3.2 pandas-2.3.1 peewee-3.18.2 protobuf-6.32.0 tzdata-2025.2 websockets-15.0.1 yfinance-0.2.65

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) (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
(5.24.1)
Collecting plotly
  Downloading plotly-6.3.0-py3-none-any.whl.metadata (8.5 kB)
Collecting narwhals>=1.15.1 (from plotly)
  Downloading narwhals-2.1.2-py3-none-any.whl.metadata (11 kB)
Requirement already satisfied: packaging in /opt/conda/lib/python3.12/site-
packages (from plotly) (24.2)
Downloading plotly-6.3.0-py3-none-any.whl (9.8 MB)
      9.8/9.8 MB
132.7 MB/s eta 0:00:00
Downloading narwhals-2.1.2-py3-none-any.whl (392 kB)
Installing collected packages: narwhals, plotly
  Attempting uninstall: plotly
    Found existing installation: plotly 5.24.1
    Uninstalling plotly-5.24.1:
      Successfully uninstalled plotly-5.24.1
Successfully installed narwhals-2.1.2 plotly-6.3.0

```

```
[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.

```
[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()
    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`.

```
[8]: 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.

```
[9]: 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.

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

```
[10]:
```

| | 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`.

```
[11]: 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`.

```
[12]: 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.

```
[13]: tesla_revenue = pd.DataFrame(columns=["Date", "Revenue"])

for row in soup.find("tbody").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.

```
[14]: 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.

```
[15]: 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.

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

```
[16]:      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")
```

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  1.620128  1.693350  1.603296  1.691667  76216000
1 2002-02-14 00:00:00-05:00  1.712707  1.716074  1.670626  1.683251  11021600
2 2002-02-15 00:00:00-05:00  1.683250  1.687458  1.658001  1.674834   8389600
3 2002-02-19 00:00:00-05:00  1.666418  1.666418  1.578048  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 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]: 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
```

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

```
[22]: 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

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

for row in soup.find("tbody").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)
    gme_revenue["Revenue"] = gme_revenue['Revenue'].str.
↳replace(',', '\$', "", regex=True)
```

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

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

```
[24]:
```

| | 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.

```
[27]: make_graph(tesla_data, tesla_revenue, 'Tesla Stock data')
```

```
/tmp/ipykernel_776/109047474.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_776/109047474.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.
```

```
<IPython.core.display.HTML object>
```

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.

```
[28]: make_graph(gme_data, gme_revenue, 'GameStop Stock data')
```

```
/tmp/ipykernel_776/109047474.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_776/109047474.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.

<IPython.core.display.HTML object>

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.