Final Assignment

January 28, 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.

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

```
Requirement already satisfied: yfinance in /opt/conda/lib/python3.12/site-
packages (0.2.52)
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) (2.2.2)
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) (0.0.11)
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) (2025.1)
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)
```

[2]:
```
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.

[3]:
```
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.**

[4]:
```
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`.

[5]:
```
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.

[6]:
```
tsla_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.

[7]:
```
tsla_data.reset_index(inplace = True)
tsla_data.head()
```

[7]:

	Date	Open	High	Low	Close	Volume	Dividends	Stock Splits
0	2010-06-29 00:00:00-04:00	1.266667	1.666667	1.169333	1.592667	281494500	0.0	0.0
1	2010-06-30 00:00:00-04:00	1.719333	2.028000	1.553333	1.588667	257806500	0.0	0.0
2	2010-07-01 00:00:00-04:00	1.666667	1.728000	1.351333	1.464000	123282000	0.0	0.0
3	2010-07-02 00:00:00-04:00	1.533333	1.540000	1.247333	1.280000	77097000	0.0	0.0
4	2010-07-06 00:00:00-04:00	1.333333	1.333333	1.055333	1.074000	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`.

[8]:
```
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`.

[9]:
```
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.
```

[10]:
```
tsla_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

    tsla_revenue = pd.concat([tsla_data, pd.DataFrame({"Date":[date], "Revenue":
↪[revenue]})], ignore_index=True)
```

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

[11]:
```
tsla_revenue["Revenue"] = tsla_revenue['Revenue'].str.replace(',|\$',"",␣
↪regex=True)
```

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

[12]:
```
tsla_revenue.dropna(inplace=True)

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

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

[13]:
```
tsla_revenue.tail()
```

[13]:
```
Empty DataFrame
Columns: [Date, Open, High, Low, Close, Volume, Dividends, Stock Splits,
Revenue]
Index: []
```

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`.

[14]:
```
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.

[15]:
```
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.

[16]:
```
gme_data.reset_index(inplace = True)
gme_data.head()
```

[16]:

	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	1.683251	1.687459	1.658002	1.674834	8389600	
3	2002-02-19 00:00:00-05:00	1.666417	1.666417	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 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`.

[17]:
```
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`.

[18]:
```
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
```

[19]:
```
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_data, pd.DataFrame({"Date":[date], "Revenue":
↪[revenue]})], ignore_index=True)

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

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

[20]:
```
gme_revenue.tail()
```

[20]:

	Date	Open	High	Low	Close	\
5772	2025-01-22 00:00:00-05:00	27.360001	28.0200	27.299999	27.650000	
5773	2025-01-23 00:00:00-05:00	27.879999	29.2600	27.680000	28.330000	
5774	2025-01-24 00:00:00-05:00	28.299999	28.6700	27.620001	27.770000	
5775	2025-01-27 00:00:00-05:00	26.920000	27.6796	26.799999	26.969999	
5776	2005	NaN	NaN	NaN	NaN	

	Volume	Dividends	Stock Splits	Revenue
5772	5025400.0	0.0	0.0	NaN
5773	8828200.0	0.0	0.0	NaN
5774	4488200.0	0.0	0.0	NaN
5775	4927243.0	0.0	0.0	NaN
5776	NaN	NaN	NaN	$1,843

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

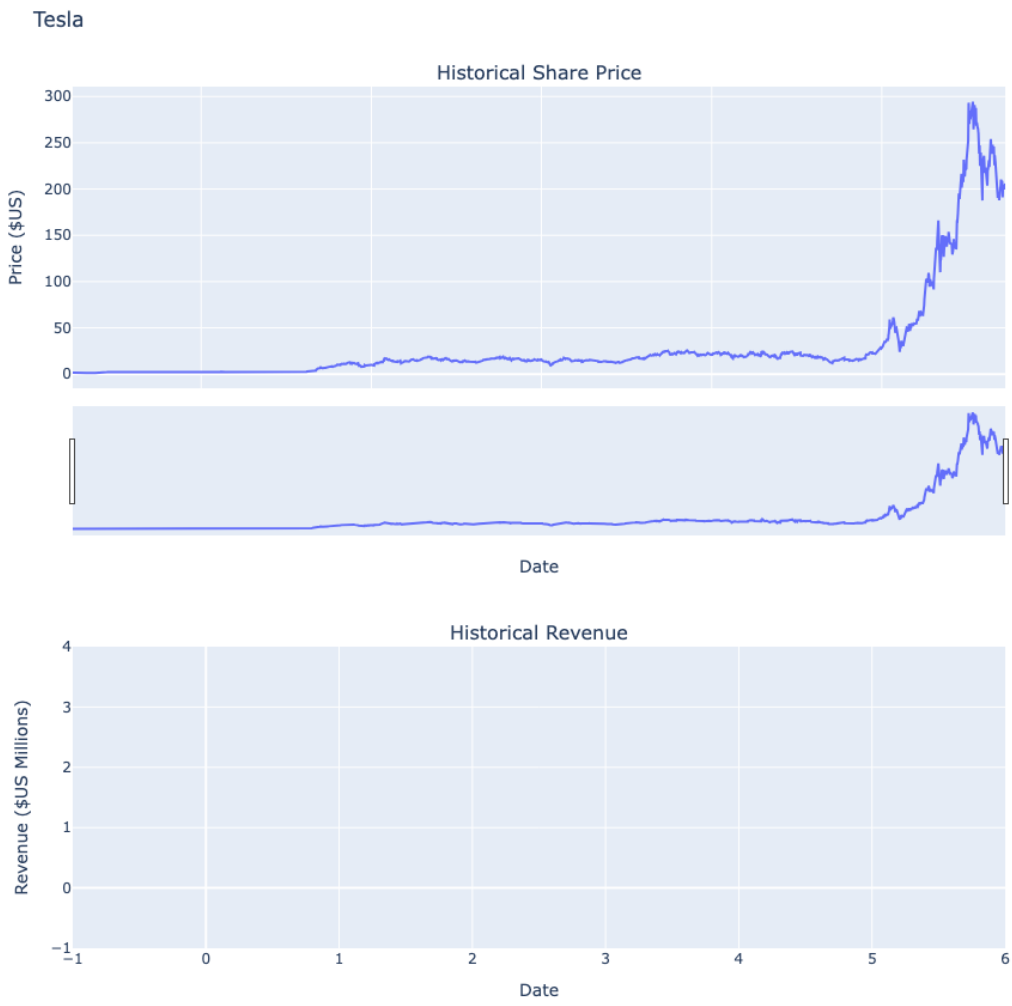
[21]:
```
make_graph(tsla_data[['Date','Close']], tsla_revenue, 'Tesla')
```

```
/tmp/ipykernel_1906/3316612210.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_1906/3316612210.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 graphs`

[22]:
```
make_graph(gme_data[['Date','Close']], gme_revenue, 'GameStop')
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
```

```
Cell In[22], line 1
----> 1 make_graph(gme_data[['Date','Close']], gme_revenue, 'GameStop')

Cell In[4], line 4, in make_graph(stock_data, revenue_data, stock)
      2 fig = make_subplots(rows=2, cols=1, shared_xaxes=True,␣
 ↪subplot_titles=("Historical Share Price", "Historical Revenue"),␣
 ↪vertical_spacing = .3)
      3 stock_data_specific = stock_data[stock_data.Date <= '2021-06-14']
----> 4 revenue_data_specific = revenue_data[revenue_data.Date <= '2021-04-30']
      5 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)
      6 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)

File /opt/conda/lib/python3.12/site-packages/pandas/core/ops/common.py:76, in␣
 ↪_unpack_zerodim_and_defer.<locals>.new_method(self, other)
     72             return NotImplemented
     74 other = item_from_zerodim(other)
---> 76 return method(self, other)

File /opt/conda/lib/python3.12/site-packages/pandas/core/arraylike.py:52, in␣
 ↪OpsMixin.__le__(self, other)
     50 @unpack_zerodim_and_defer("__le__")
     51 def __le__(self, other):
---> 52     return self._cmp_method(other, operator.le)

File /opt/conda/lib/python3.12/site-packages/pandas/core/series.py:6119, in␣
 ↪Series._cmp_method(self, other, op)
   6116 lvalues = self._values
   6117 rvalues = extract_array(other, extract_numpy=True, extract_range=True)
-> 6119 res_values = ops.comparison_op(lvalues, rvalues, op)
   6121 return self._construct_result(res_values, name=res_name)

File /opt/conda/lib/python3.12/site-packages/pandas/core/ops/array_ops.py:344,␣
 ↪in comparison_op(left, right, op)
    341     return invalid_comparison(lvalues, rvalues, op)
    343 elif lvalues.dtype == object or isinstance(rvalues, str):
--> 344     res_values = comp_method_OBJECT_ARRAY(op, lvalues, rvalues)
    346 else:
    347     res_values = _na_arithmetic_op(lvalues, rvalues, op, is_cmp=True)

File /opt/conda/lib/python3.12/site-packages/pandas/core/ops/array_ops.py:129,␣
 ↪in comp_method_OBJECT_ARRAY(op, x, y)
    127     result = libops.vec_compare(x.ravel(), y.ravel(), op)
    128 else:
--> 129     result = libops.scalar_compare(x.ravel(), y, op)
```

```
    130 return result.reshape(x.shape)

File ops.pyx:107, in pandas._libs.ops.scalar_compare()

TypeError: '<=' not supported between instances of 'Timestamp' and 'str'
```

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

##