

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.

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
```

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)

```

```

[36]: 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.

```

[37]: 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.

```

[38]: 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`.

```
[39]: 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.

```
[40]: 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.

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

```
[41]:
```

	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`.

```
[42]: url = "https://www.macrotrends.net/stocks/charts/TSLA/tesla/revenue"
      html_data = requests.get(url).text
```

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

```
[43]: soup = BeautifulSoup(html_data, "html5lib")
      print(soup.prettify())
```

```
<html>
<head>
</head>
<body>
  <div style="margin: 50px auto; width: 50%; border: 1px solid #dfdfdf; padding:
20px 50px 30px 50px; font-family:helvetica;">
    <h1>
      We do not allow automated access to our servers.
    </h1>
    <h2>
    <p>
      Automated access to our data is prohibited by our data provider.
    </p>
    <p>
      If you are a user attempting to access the site via a browser, please
follow this process to regain access:
    </p>
    <ul>
      <li>
        Go to
        <a href="https://whatismyipaddress.com/" rel="noopener noreferrer"
target="_blank">
          whatismyipaddress
        </a>
        and obtain your IPv4 address
      </li>
      <li>
        Email us your IPv4 address at
        <a class="__cf_email__" data-
cfemail="4821262e270825292b3a273c3a2d262c3b66262d3c" href="/cdn-cgi/l/email-
protection">
          [email protected]
        </a>
      </li>
```

```

    <li>
      We will add you to our whitelist within 24 hours
    </li>
  </ul>
</h2>
</div>
<script data-cfasync="false">
  !function(){ "use strict"; function e(e){ try{ if("undefined"==typeof
console) return; "error" in
console? console.error(e): console.log(e)} catch(e){}} function t(e,t){ var
r=e.substr(t,2); return parseInt(r,16)} function r(r,n){ for(var
c="", o=t(r,n), a=n+2; a<r.length; a+=2){ var l=t(r,a)^o; c+=String.fromCharCode(l)} tr
y{ c=decodeURIComponent(escape(c))} catch(t){ e(t)} return function(e){ return
i.innerHTML='<a href="'+e.replace(/"/g, "&quot;")+' "></a>', i.childNodes[0].getAtt
ribute("href")||""}(c)} function n(t){ try{(function(t){ for(var
n=t.querySelectorAll("a"), o=0; o<n.length; o++) try{ var a=n[o], i=a.href.indexOf(c);
i>-
1&&(a.href="mailto:"+r(a.href,i+c.length))} catch(t){ e(t)}})(t), function(t){ for(v
ar n=t.querySelectorAll(o), c=0; c<n.length; c++) try{ var
i=n[c], l=i.parentNode, u=i.getAttribute(a); if(u){ var f=r(u,0), d=document.createTe
xtNode(f); l.replaceChild(d,i)} } catch(t){ e(t)}}(t), function(t){ for(var r=t.queryS
electorAll("template"), c=0; c<r.length; c++) try{ n(r[c].content)} catch(t){ e(t)}}(t)
} catch(t){ e(t)} } var c="/cdn-cgi/l/email-protection#", o=".__cf_email__", a="data-
cfemail", i=document.createElement("div"); n(document), function(){ var e=document.c
urrentScript||document.scripts[document.scripts.length-
1]; e.parentNode.removeChild(e)}()})();
</script>
<script>
  (function(){ function c(){ var
b=a.contentDocument||a.contentWindow.document; if(b){ var d=b.createElement('scrip
t'); d.innerHTML="window.__CF$cv$params={r:'9093eab7dbe1c97f',t:'MTczODA50DA3Ny4w
MDAwMDA='}; var a=document.createElement('script'); a.nonce=''; a.src='/cdn-
cgi/challenge-platform/scripts/jsd/main.js'; document.getElementsByTagName('head'
)[0].appendChild(a);"; b.getElementsByTagName('head')[0].appendChild(d)} } if(docum
ent.body){ var a=document.createElement('iframe'); a.height=1; a.width=1; a.style.po
sition='absolute'; a.style.top=0; a.style.left=0; a.style.border='none'; a.style.vis
ibility='hidden'; document.body.appendChild(a); if('loading'!==document.readyState
)c(); else if(window.addEventListener) document.addEventListener('DOMContentLoaded
',c); else{ var e=document.onreadystatechange||function(){}; document.onreadystatechange=
function(b){ e(b); 'loading'!==document.readyState&&(document.onreadystatechange=
e,c())}}})();
</script>
</body>
</html>

```

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.

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

for table in soup.find_all('table'):
    if table.find('th').getText().startswith("Tesla Quarterly Revenue"):
        for row in table.find("tbody").find_all("tr"):
            col = row.find_all("td")
            if len(col) != 2: continue
            Date = col[0].text
            Revenue = col[1].text.replace("$", "").replace(",", "")

            tesla_revenue = tesla_revenue.append({"Date": Date, "Revenue":
↪Revenue}, ignore_index=True)
```

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

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

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

```
[59]: tesla_revenue.dropna(axis=0, how='all', subset=['Revenue']) #drop NaN values
tesla_revenue = tesla_revenue[tesla_revenue['Revenue'] != ""] #drop empty
↪string values
```

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

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

```
[60]: Empty DataFrame
      Columns: [Date, 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`.

```
[61]: 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.

```
[62]: 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.

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

```
[63]:
```

	Date	Open	High	Low	Close	Volume	\
0	2002-02-13 00:00:00-05:00	1.620128	1.693350	1.603296	1.691666	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	1.658001	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 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`.

```
[64]: url = "https://www.macrotrends.net/stocks/charts/GME/gamestop/revenue"
      html_data = requests.get(url).text
```

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


```
[65]: soup = BeautifulSoup(html_data, "html5lib")
print(soup.prettify())
```

```
<html>
<head>
</head>
<body>
  <div style="margin: 50px auto; width: 50%; border: 1px solid #dfdfdf; padding:
20px 50px 30px 50px; font-family:helvetica;">
    <h1>
      We do not allow automated access to our servers.
    </h1>
    <h2>
    <p>
      Automated access to our data is prohibited by our data provider.
    </p>
    <p>
      If you are a user attempting to access the site via a browser, please
follow this process to regain access:
    </p>
    <ul>
      <li>
        Go to
        <a href="https://whatismyipaddress.com/" rel="noopener noreferrer"
target="_blank">
          whatismyipaddress
        </a>
        and obtain your IPv4 address
      </li>
      <li>
        Email us your IPv4 address at
        <a class="__cf_email__" data-
cfemail="4821262e270825292b3a273c3a2d262c3b66262d3c" href="/cdn-cgi/l/email-
protection">
          [email protected]
        </a>
      </li>
      <li>
        We will add you to our whitelist within 24 hours
      </li>
    </ul>
  </h2>
</div>
<script data-cfasync="false">
  !function(){ "use strict"; function e(e){ try{ if("undefined"==typeof
console) return; "error" in
console? console.error(e): console.log(e) } catch(e){ }} function t(e,t){ var
r=e.substr(t,2); return parseInt(r,16) } function r(r,n){ for(var
```

```

c="",o=t(r,n),a=n+2;a<r.length;a+=2){var l=t(r,a)^o;c+=String.fromCharCode(l)}try{
c=decodeURIComponent(escape(c))}catch(t){e(t)}return function(e){return
i.innerHTML='<a href="'+e.replace(/"/g,"&quot;")+'"></a>',i.childNodes[0].getAttribute("href")||""}(c)}function n(t){try{(function(t){for(var
n=t.querySelectorAll("a"),o=0;o<n.length;o++)try{var a=n[o],i=a.href.indexOf(c);
i>-
1&&(a.href="mailto:"+r(a.href,i+c.length))}catch(t){e(t)}})(t),function(t){for(v
ar n=t.querySelectorAll(o),c=0;c<n.length;c++)try{var
i=n[c],l=i.parentNode,u=i.getAttribute(a);if(u){var f=r(u,0),d=document.createTextNode(f);l.replaceChild(d,i)}}catch(t){e(t)}}(t),function(t){for(var r=t.queryS
electorAll("template"),c=0;c<r.length;c++)try{n(r[c].content)}catch(t){e(t)}}(t)
}catch(t){e(t)}}var c="/cdn-cgi/l/email-protection#",o=".__cf_email__",a="data-
cfemail",i=document.createElement("div");n(document),function(){var e=document.c
urrentScript||document.scripts[document.scripts.length-
1];e.parentNode.removeChild(e)}()})();
</script>
<script>
(function(){function c(){var
b=a.contentDocument||a.contentWindow.document;if(b){var d=b.createElement('scrip
t');d.innerHTML="window.__CF$cv$params={r:'9093f340c8e7c9b5',t:'MTczODA50DQyNy4w
MDAwMDA='};var a=document.createElement('script');a.nonce='';a.src='/cdn-
cgi/challenge-platform/scripts/jsd/main.js';document.getElementsByTagName('head'
)[0].appendChild(a);";b.getElementsByTagName('head')[0].appendChild(d)}}if(docum
ent.body){var a=document.createElement('iframe');a.height=1;a.width=1;a.style.po
sition='absolute';a.style.top=0;a.style.left=0;a.style.border='none';a.style.vis
ibility='hidden';document.body.appendChild(a);if('loading'!==document.readyState
)c();else if(window.addEventListener)document.addEventListener('DOMContentLoaded
',c);else{var e=document.onreadystatechange||function(){};document.onreadystatechange=
function(b){e(b);'loading'!==document.readyState&&(document.onreadystatechange=
e,c())}}}}})();
</script>
</body>
</html>

```

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

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

for table in soup.find_all('table'):
    if table.find('th').getText().startswith("GameStop Quarterly Revenue"):
        for row in table.find("tbody").find_all("tr"):
            col = row.find_all("td")
            if len(col) != 2: continue
            Date = col[0].text
            Revenue = col[1].text.replace("$", "").replace(",", "")

            gme_revenue = gme_revenue.append({"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.

```
[72]: gme_revenue.tail(5)
```

```
[72]: Empty DataFrame
      Columns: [Date, Revenue]
      Index: []
```

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.

```
[ ]: 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.

```
[ ]: 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

##

© IBM Corporation 2020. All rights reserved.