Final Assignment

October 2, 2024

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.

[1]:
```
#!pip install yfinance==0.2.38
#!pip install pandas==2.2.2
#!pip install nbformat
```

[2]:
```
!pip install yfinance
!pip install bs4
!pip install nbformat
```

```
Collecting yfinance
  Downloading yfinance-0.2.44-py2.py3-none-any.whl.metadata (13 kB)
Collecting pandas>=1.3.0 (from yfinance)
  Downloading
pandas-2.2.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata
(89 kB)
                            89.9/89.9 kB
10.3 MB/s eta 0:00:00
```

```
Collecting numpy>=1.16.5 (from yfinance)
  Downloading
numpy-2.1.1-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata
(60 kB)
                           60.9/60.9 kB
6.0 MB/s eta 0:00:00
Requirement already satisfied: requests>=2.31 in
/opt/conda/lib/python3.11/site-packages (from yfinance) (2.31.0)
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-cp311-cp311-manylinux_2_28_x86_64.whl.metadata (3.8 kB)
Requirement already satisfied: platformdirs>=2.0.0 in
/opt/conda/lib/python3.11/site-packages (from yfinance) (4.2.1)
Requirement already satisfied: pytz>=2022.5 in /opt/conda/lib/python3.11/site-
packages (from yfinance) (2024.1)
Collecting frozendict>=2.3.4 (from yfinance)
  Downloading frozendict-2.4.4-py311-none-any.whl.metadata (23 kB)
Collecting peewee>=3.16.2 (from yfinance)
  Downloading peewee-3.17.6.tar.gz (3.0 MB)
                           3.0/3.0 MB
81.2 MB/s eta 0:00:00:00:01
  Installing build dependencies … done
  Getting requirements to build wheel … done
  Preparing metadata (pyproject.toml) … done
Requirement already satisfied: beautifulsoup4>=4.11.1 in
/opt/conda/lib/python3.11/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/python3.11/site-
packages (from beautifulsoup4>=4.11.1->yfinance) (2.5)
Requirement already satisfied: six>=1.9 in /opt/conda/lib/python3.11/site-
packages (from html5lib>=1.1->yfinance) (1.16.0)
Requirement already satisfied: webencodings in /opt/conda/lib/python3.11/site-
packages (from html5lib>=1.1->yfinance) (0.5.1)
Requirement already satisfied: python-dateutil>=2.8.2 in
/opt/conda/lib/python3.11/site-packages (from pandas>=1.3.0->yfinance) (2.9.0)
Collecting tzdata>=2022.7 (from pandas>=1.3.0->yfinance)
  Downloading tzdata-2024.2-py2.py3-none-any.whl.metadata (1.4 kB)
Requirement already satisfied: charset-normalizer<4,>=2 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /opt/conda/lib/python3.11/site-
packages (from requests>=2.31->yfinance) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance) (2.2.1)
Requirement already satisfied: certifi>=2017.4.17 in
/opt/conda/lib/python3.11/site-packages (from requests>=2.31->yfinance)
(2024.6.2)
```

```
Downloading yfinance-0.2.44-py2.py3-none-any.whl (94 kB)
                         94.6/94.6 kB
11.1 MB/s eta 0:00:00
Downloading frozendict-2.4.4-py311-none-any.whl (16 kB)
Downloading html5lib-1.1-py2.py3-none-any.whl (112 kB)
                         112.2/112.2 kB
15.3 MB/s eta 0:00:00
Downloading lxml-5.3.0-cp311-cp311-manylinux_2_28_x86_64.whl (5.0 MB)
                         5.0/5.0 MB
82.5 MB/s eta 0:00:00ta 0:00:01
Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)
Downloading
numpy-2.1.1-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (16.3 MB)
                         16.3/16.3 MB
85.7 MB/s eta 0:00:00:00:0100:01
Downloading
pandas-2.2.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (13.1
MB)
                         13.1/13.1 MB
76.1 MB/s eta 0:00:00:00:0100:01
Downloading tzdata-2024.2-py2.py3-none-any.whl (346 kB)
                         346.6/346.6 kB
28.4 MB/s eta 0:00:00
Building wheels for collected packages: peewee
  Building wheel for peewee (pyproject.toml) … done
  Created wheel for peewee: filename=peewee-3.17.6-py3-none-any.whl
size=138891
sha256=4088aedf8fffe97673f8c17d75b1561ab479b63c18c0424e68c5ed52c6aaf2b
  Stored in directory: /home/jupyterlab/.cache/pip/wheels/1c/09/7e/9f659fde248ec
dc1722a142c1d744271aad3914a0afc191058
Successfully built peewee
Installing collected packages: peewee, multitasking, tzdata, numpy, lxml,
html5lib, frozendict, pandas, yfinance
Successfully installed frozendict-2.4.4 html5lib-1.1 lxml-5.3.0
multitasking-0.0.11 numpy-2.1.1 pandas-2.2.3 peewee-3.17.6 tzdata-2024.2
yfinance-0.2.44
Collecting bs4
  Downloading bs4-0.0.2-py2.py3-none-any.whl.metadata (411 bytes)
Requirement already satisfied: beautifulsoup4 in /opt/conda/lib/python3.11/site-
packages (from bs4) (4.12.3)
Requirement already satisfied: soupsieve>1.2 in /opt/conda/lib/python3.11/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/python3.11/site-
packages (5.10.4)
Requirement already satisfied: fastjsonschema>=2.15 in
```

```
/opt/conda/lib/python3.11/site-packages (from nbformat) (2.19.1)
Requirement already satisfied: jsonschema>=2.6 in
/opt/conda/lib/python3.11/site-packages (from nbformat) (4.22.0)
Requirement already satisfied: jupyter-core!=5.0.*,>=4.12 in
/opt/conda/lib/python3.11/site-packages (from nbformat) (5.7.2)
Requirement already satisfied: traitlets>=5.1 in /opt/conda/lib/python3.11/site-
packages (from nbformat) (5.14.3)
Requirement already satisfied: attrs>=22.2.0 in /opt/conda/lib/python3.11/site-
packages (from jsonschema>=2.6->nbformat) (23.2.0)
Requirement already satisfied: jsonschema-specifications>=2023.03.6 in
/opt/conda/lib/python3.11/site-packages (from jsonschema>=2.6->nbformat)
(2023.12.1)
Requirement already satisfied: referencing>=0.28.4 in
/opt/conda/lib/python3.11/site-packages (from jsonschema>=2.6->nbformat)
(0.35.1)
Requirement already satisfied: rpds-py>=0.7.1 in /opt/conda/lib/python3.11/site-
packages (from jsonschema>=2.6->nbformat) (0.18.0)
Requirement already satisfied: platformdirs>=2.5 in
/opt/conda/lib/python3.11/site-packages (from jupyter-
core!=5.0.*,>=4.12->nbformat) (4.2.1)
```

[3]:
```python
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.

[4]:
```python
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.**

[5]:
```python
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),␣
↪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),␣
↪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`.

[6]:
```
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.

[7]:
```
tesla_data = tesla.history(period = "max")
df = tesla_data
```

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.

[8]:
```
df.reset_index(inplace = True)
df.head()
```

[8]:
```
                       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`.

[9]:
```python
#Step 1
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`. Make sure to use the `html_data` with the content parameter as follow `html_data.content` .

[10]:
```python
#Step 2
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`.

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. Find All Tables: Start by searching for all HTML tables on a webpage using `soup.find_all('
2. Identify the Relevant Table: then loops through each table. If a table contains the text "T
3. Initialize a DataFrame: Create an empty Pandas DataFrame called `tesla_revenue` with column
4. Loop Through Rows: For each row in the relevant table, extract the data from the first and 
5. Clean Revenue Data: Remove dollar signs and commas from the revenue value.
6. Add Rows to DataFrame: Create a new row in the DataFrame with the extracted date and cleane
7. Repeat for All Rows: Continue this process for all rows in the table.
```

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.
> Note: Instead of using the deprecated pd.append() method, consider using pd.concat([df, pd.Da
```

[11]:
```
#Step 3
table=soup.find_all('tbody')[1]

#Step 4
tesla_revenue= pd.DataFrame(columns=["Date","Revenue"])

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

# Step 6
tesla_revenue["Revenue"] = tesla_revenue['Revenue'].str.replace(r',|\$',"",␣
 ↪regex=True)
tesla_revenue.dropna(inplace=True)
tesla_revenue = tesla_revenue[tesla_revenue['Revenue'] != ""]


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
```

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

[12]:
```
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.

[13]:
```
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.

```
[14]: 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`.

```
[15]: 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.

```
[16]: 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.

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

```
[17]:                        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  1.716073  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  1.615921  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`.

[18]:
```
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`.

[20]:
```
soup1 = BeautifulSoup(html_data_2,"html5lib")
```

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
```

[21]:
```
#Step 3
table=soup1.find_all('tbody')[1]

#Step 4
gme_revenue= pd.DataFrame(columns=["Date","Revenue"])

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

# Step 6
gme_revenue["Revenue"] = gme_revenue['Revenue'].str.replace(r',|\$',"",␣
↪regex=True)
gme_revenue.dropna(inplace=True)
gme_revenue = gme_revenue[gme_revenue['Revenue'] != ""]
```

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

[22]:
```
print(gme_revenue.tail())
```

```
          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
```

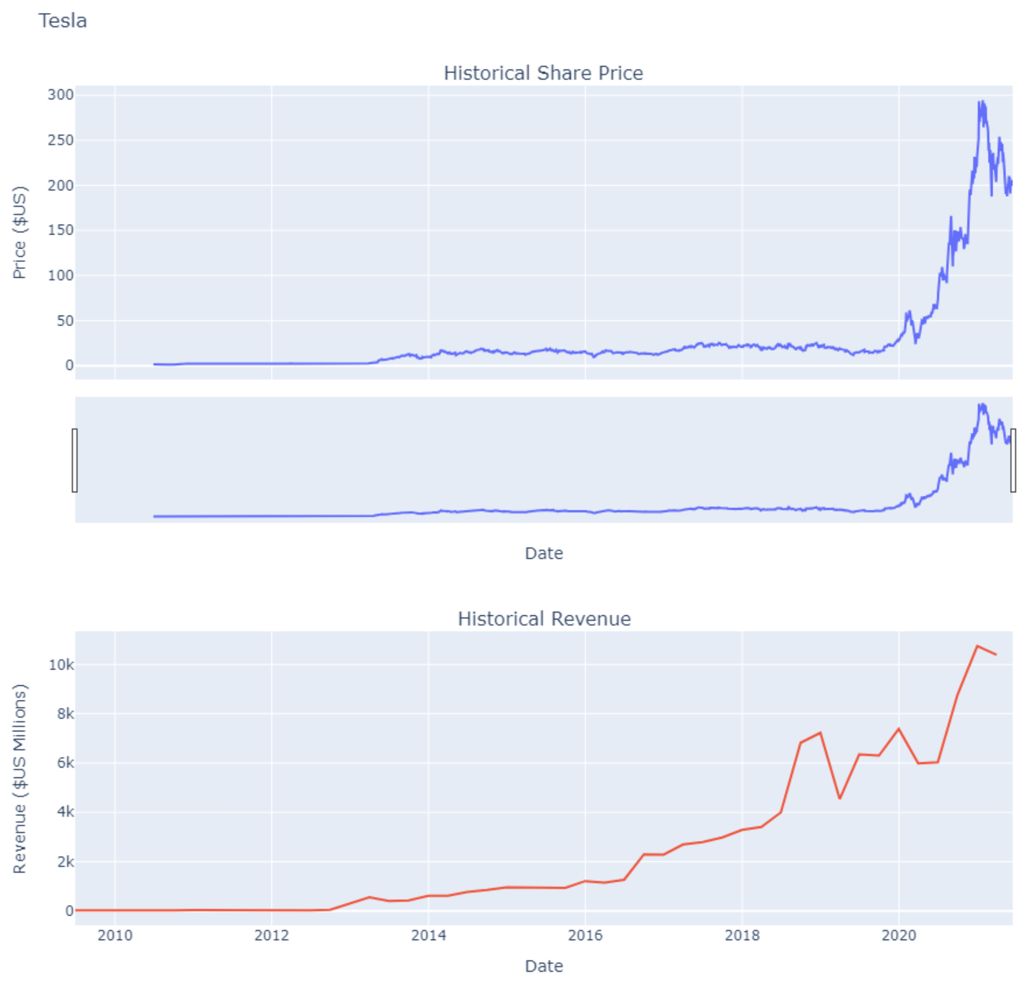
0.6 Question 5: Plot Tesla Stock Graph

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 graphs
```

[23]:
```python
make_graph(tesla_data, tesla_revenue, "Tesla")
```



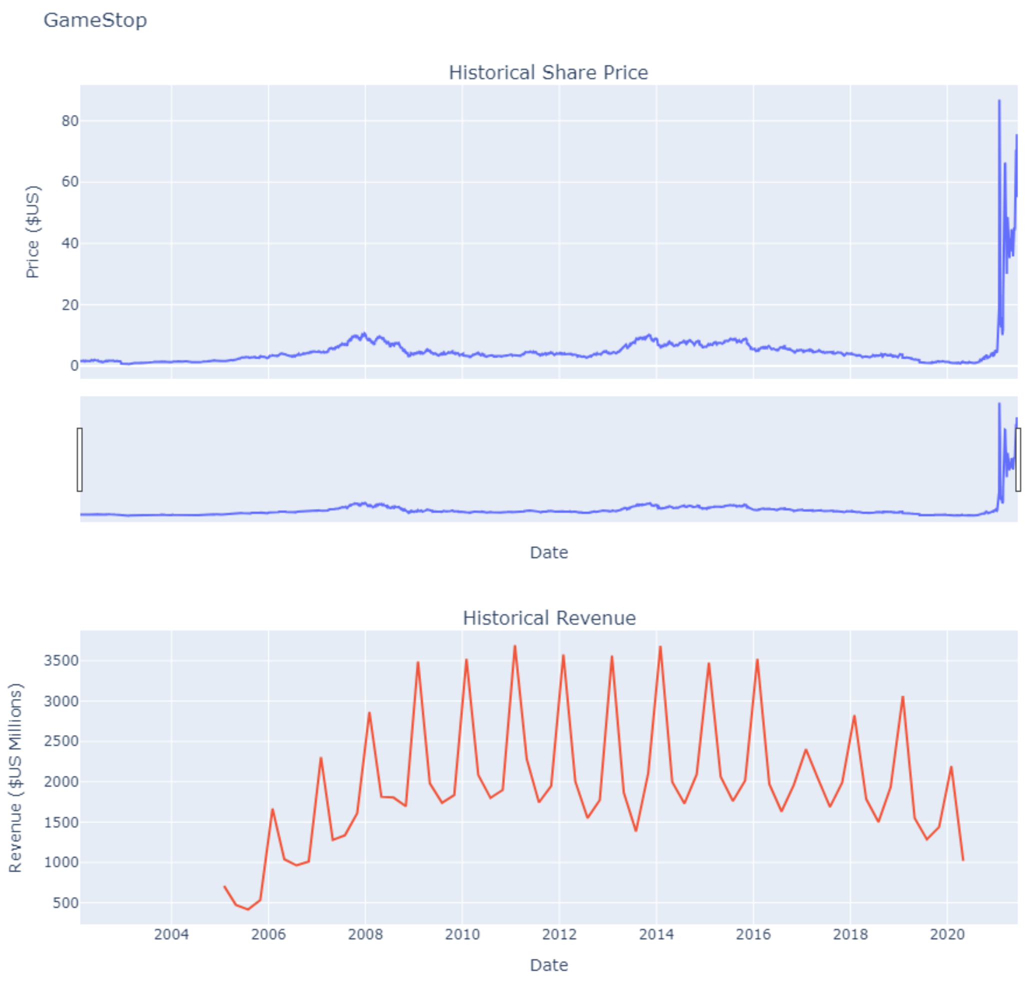
0.7 Question 6: Plot GameStop Stock Graph

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 graphs
```

[24]:
```
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.

##

```
toggle ## Change Log        toggle | Date (YYYY-MM-DD) | Version | Changed By    |
Change Description        | toggle | ----------------- | ------- | ------------- |
------------------------- | toggle | 2022-02-28        | 1.2     | Lakshmi Holla |
Changed the URL of GameStop | toggle | 2020-11-10        | 1.1     | Malika Singla
| Deleted the Optional part | toggle | 2020-08-27        | 1.0     | Malika Singla
| Added lab to GitLab       |
```