



# 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 in IBM Cloud Watson Studio, please replace the command for installing nbformat from `!pip install nbformat==4.2.0` to simply `!pip install nbformat`

```
In [1]: !pip install yfinance==0.1.67
!mamba install bs4==4.10.0 -y
!pip install nbformat==4.2.0
```

Collecting yfinance==0.1.67

Downloading yfinance-0.1.67-py2.py3-none-any.whl (25 kB)

Requirement already satisfied: pandas>=0.24 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from yfinance==0.1.67) (1.3.5)

Requirement already satisfied: numpy>=1.15 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from yfinance==0.1.67) (1.21.6)

Requirement already satisfied: requests>=2.20 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from yfinance==0.1.67) (2.29.0)

Collecting multitasking>=0.0.7 (from yfinance==0.1.67)

Downloading multitasking-0.0.11-py3-none-any.whl (8.5 kB)

Requirement already satisfied: lxml>=4.5.1 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from yfinance==0.1.67) (4.9.2)

Requirement already satisfied: python-dateutil>=2.7.3 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from pandas>=0.24->yfinance==0.1.67) (2.8.2)

Requirement already satisfied: pytz>=2017.3 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from pandas>=0.24->yfinance==0.1.67) (2023.3)

Requirement already satisfied: charset-normalizer<4,>=2 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests>=2.20->yfinance==0.1.67) (3.1.0)

Requirement already satisfied: idna<4,>=2.5 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests>=2.20->yfinance==0.1.67) (3.4)

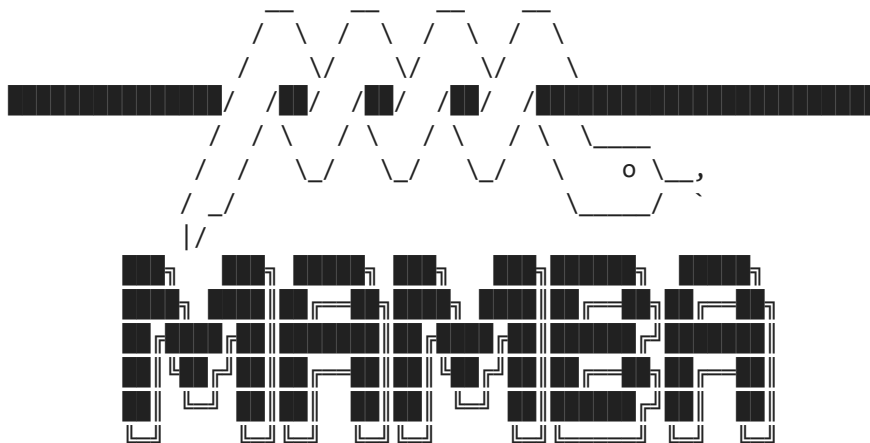
Requirement already satisfied: urllib3<1.27,>=1.21.1 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests>=2.20->yfinance==0.1.67) (1.26.15)

Requirement already satisfied: certifi>=2017.4.17 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from requests>=2.20->yfinance==0.1.67) (2023.5.7)

Requirement already satisfied: six>=1.5 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from python-dateutil>=2.7.3->pandas>=0.24->yfinance==0.1.67) (1.16.0)

Installing collected packages: multitasking, yfinance

Successfully installed multitasking-0.0.11 yfinance-0.1.67



mamba (1.4.2) supported by @QuantStack

GitHub: <https://github.com/mamba-org/mamba>

Twitter: <https://twitter.com/QuantStack>

Looking for: ['bs4==4.10.0']

[+] 0.0s						
[+] 0.1s						
pkgs/main/linux-64		0.0 B /	???.?MB @	???.?MB/s	0.1s	
pkgs/main/noarch		0.0 B /	???.?MB @	???.?MB/s	0.1s	
pkgs/r/linux-64		0.0 B /	???.?MB @	???.?MB/s	0.1s	
pkgs/r/noarch		0.0 B /	???.?MB @	???.?MB/s	0.1s	[+]
0.2s						
pkgs/main/linux-64		0.0 B /	???.?MB @	???.?MB/s	0.2s	
pkgs/main/noarch		0.0 B /	???.?MB @	???.?MB/s	0.2s	
pkgs/r/linux-64		0.0 B /	???.?MB @	???.?MB/s	0.2s	
pkgs/r/noarch		0.0 B /	???.?MB @	???.?MB/s	0.2s	[+]
0.3s						
pkgs/main/linux-64		303.1kB /	???.?MB @	1.1MB/s	0.3s	
pkgs/main/noarch		315.4kB /	???.?MB @	1.2MB/s	0.3s	
pkgs/r/linux-64		389.1kB /	???.?MB @	1.4MB/s	0.3s	
pkgs/r/noarch		237.6kB /	???.?MB @	829.1kB/s	0.3s	[+]
0.4s						
pkgs/main/linux-64		634.9kB /	???.?MB @	1.7MB/s	0.4s	
pkgs/main/noarch		733.2kB /	???.?MB @	2.0MB/s	0.4s	
pkgs/r/linux-64		835.6kB /	???.?MB @	2.2MB/s	0.4s	
pkgs/r/noarch		938.0kB /	???.?MB @	2.4MB/s	0.4s	spkg
s/main/noarch		859.2kB @	2.1MB/s	0.4s		
[+] 0.5s						
pkgs/main/linux-64		1.1MB /	???.?MB @	2.2MB/s	0.5s	
pkgs/r/linux-64		1.2MB /	???.?MB @	2.5MB/s	0.5s	
pkgs/r/noarch		1.3MB /	???.?MB @	2.7MB/s	0.5s	[+]
0.6s						
pkgs/main/linux-64		1.5MB /	???.?MB @	2.7MB/s	0.6s	
pkgs/r/linux-64		1.6MB /	???.?MB @	2.7MB/s	0.6s	
pkgs/r/noarch		1.7MB /	???.?MB @	2.9MB/s	0.6s	spkg
s/r/linux-64		1.9MB @	2.9MB/s	0.7s		
[+] 0.7s						
pkgs/main/linux-64		2.0MB /	???.?MB @	2.9MB/s	0.7s	
pkgs/r/noarch		2.2MB /	???.?MB @	3.2MB/s	0.7s	spkg
s/r/noarch		2.3MB @	3.2MB/s	0.8s		
[+] 0.8s						
pkgs/main/linux-64		2.0MB /	???.?MB @	2.9MB/s	0.8s	[+]
0.9s						
pkgs/main/linux-64		2.8MB /	???.?MB @	3.3MB/s	0.9s	[+]
1.0s						
pkgs/main/linux-64		3.3MB /	???.?MB @	3.4MB/s	1.0s	[+]
1.1s						
pkgs/main/linux-64		3.7MB /	???.?MB @	3.5MB/s	1.1s	[+]
1.2s						
pkgs/main/linux-64		4.2MB /	???.?MB @	3.6MB/s	1.2s	[+]
1.3s						
pkgs/main/linux-64		4.6MB /	???.?MB @	3.6MB/s	1.3s	[+]
1.4s						
pkgs/main/linux-64		5.0MB /	???.?MB @	3.7MB/s	1.4s	[+]
1.5s						
pkgs/main/linux-64		5.5MB /	???.?MB @	3.7MB/s	1.5s	[+]
1.6s						
pkgs/main/linux-64		6.0MB /	???.?MB @	3.7MB/s	1.6s	[+]
1.7s						
pkgs/main/linux-64		6.4MB /	???.?MB @	3.8MB/s	1.7s	[+]
1.8s						

pkgs/main/linux-64

6.6MB @ 3.8MB/s Finalizing 1.8spkg

s/main/linux-64

@ 3.8MB/s 1.9s

Pinned packages:

- python 3.7.\*

Transaction

Prefix: /home/jupyterlab/conda/envs/python

Updating specs:

- bs4==4.10.0
- ca-certificates
- certifi
- openssl

Package	Version	Build	Channel	Size
Install:				
+ bs4	4.10.0	hd3eb1b0_0	pkgs/main/noarch	10kB
Upgrade:				
- ca-certificates	2023.5.7	hbcca054_0	conda-forge	
+ ca-certificates	2023.12.12	h06a4308_0	pkgs/main/linux-64	129kB
- openssl	1.1.1t	h0b41bf4_0	conda-forge	
+ openssl	1.1.1w	h7f8727e_0	pkgs/main/linux-64	4MB
Downgrade:				
- beautifulsoup4	4.11.1	pyha770c72_0	conda-forge	
+ beautifulsoup4	4.10.0	pyh06a4308_0	pkgs/main/noarch	87kB
Summary:				
Install: 1 packages				
Upgrade: 2 packages				
Downgrade: 1 packages				
Total download: 4MB				

[+] 0.0s

Downloading

0.0 B

0.0s

Extracting

0

0.0s[+]

0.1s

Downloading (4)

0.0 B beautifulsoup4

0.0s

```

Extracting _____ 0 0.0sbs4
10.2kB @ 71.5kB/s 0.1s
beautifulsoup4 86.6kB @ 563.8kB/s 0.2s
ca-certificates 128.7kB @ 832.5kB/s 0.2s
[+] 0.2s
Downloading (1) - _____ 225.5kB openssl 0.1s
Extracting (3) _____ 0 beautifulsoup4 0.0sopen
ssl 3.9MB @ 15.0MB/s 0.3s
[+] 0.3s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 beautifulsoup4 0.1s[+]
0.4s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 beautifulsoup4 0.2s[+]
0.5s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 beautifulsoup4 0.3s[+]
0.6s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 bs4 0.4s[+]
0.7s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 bs4 0.5s[+]
0.8s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 bs4 0.6s[+]
0.9s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 bs4 0.7s[+]
1.0s
Downloading _____ 4.1MB 0.2s
Extracting (4) _____ 0 ca-certificates 0.8s[+]
1.1s
Downloading _____ 4.1MB 0.2s
Extracting (4) - _____ 0 ca-certificates 0.9s[+]
1.2s
Downloading _____ 4.1MB 0.2s
Extracting (4) - _____ 0 ca-certificates 1.0s[+]
1.3s
Downloading _____ 4.1MB 0.2s
Extracting (4) - _____ 0 ca-certificates 1.1s[+]
1.4s
Downloading _____ 4.1MB 0.2s
Extracting (3) _____ 1 openssl 1.2s[+]
1.5s
Downloading _____ 4.1MB 0.2s
Extracting (1) _____ 3 openssl 1.3s[+]
1.6s
Downloading _____ 4.1MB 0.2s
Extracting (1) _____ 3 openssl 1.4s
Downloading and Extracting Packages

```

```

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
Collecting nbformat==4.2.0

```

Downloading nbformat-4.2.0-py2.py3-none-any.whl (153 kB)

153.3/153.3 kB 26.8 MB/s eta 0:00:00

Requirement already satisfied: ipython-genutils in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from nbformat==4.2.0) (0.2.0)

Requirement already satisfied: jsonschema!=2.5.0,>=2.4 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from nbformat==4.2.0) (4.17.3)

Requirement already satisfied: jupyter-core in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from nbformat==4.2.0) (4.12.0)

Requirement already satisfied: traitlets>=4.1 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from nbformat==4.2.0) (5.9.0)

Requirement already satisfied: attrs>=17.4.0 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (23.1.0)

Requirement already satisfied: importlib-metadata in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (4.11.4)

Requirement already satisfied: importlib-resources>=1.4.0 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (5.12.0)

Requirement already satisfied: pkgutil-resolve-name>=1.3.10 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (1.3.10)

Requirement already satisfied: pyparsing!=0.17.0,!0.17.1,!0.17.2,>=0.14.0 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (0.19.3)

Requirement already satisfied: typing-extensions in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (4.5.0)

Requirement already satisfied: zipp>=3.1.0 in /home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from importlib-resources>=1.4.0->jsonschema!=2.5.0,>=2.4->nbformat==4.2.0) (3.15.0)

Installing collected packages: nbformat

Attempting uninstall: nbformat

Found existing installation: nbformat 5.8.0

Uninstalling nbformat-5.8.0:

Successfully uninstalled nbformat-5.8.0

ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the source of the following dependency conflicts.

jupyter-server 1.24.0 requires nbformat>=5.2.0, but you have nbformat 4.2.0 which is incompatible.

nbclient 0.7.4 requires nbformat>=5.1, but you have nbformat 4.2.0 which is incompatible.

nbconvert 7.4.0 requires nbformat>=5.1, but you have nbformat 4.2.0 which is incompatible.

Successfully installed nbformat-4.2.0

```
In [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.

```
In [4]: import warnings
# Ignore all warnings
warnings.filterwarnings("ignore", category=FutureWarning)
```

## 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.

```
In [5]: def make_graph(stock_data, revenue_data, stock):
    fig = make_subplots(rows=2, cols=1, shared_xaxes=True, subplot_titles=("Histori
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_datet
fig.add_trace(go.Scatter(x=pd.to_datetime(revenue_data_specific.Date, infer_dat
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()
```

## 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`.

```
In [33]: 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.

```
In [34]: 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.

```
In [35]: tesla_data.reset_index(inplace=True)
tesla_data.head()
```

Out[35]:

	Date	Open	High	Low	Close	Volume	Dividends	Stock Splits
0	2010-06-29	1.266667	1.666667	1.169333	1.592667	281494500	0	0.0
1	2010-06-30	1.719333	2.028000	1.553333	1.588667	257806500	0	0.0
2	2010-07-01	1.666667	1.728000	1.351333	1.464000	123282000	0	0.0
3	2010-07-02	1.533333	1.540000	1.247333	1.280000	77097000	0	0.0
4	2010-07-06	1.333333	1.333333	1.055333	1.074000	103003500	0	0.0

## 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`.

```
In [36]: 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`.

```
In [37]: beautiful_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`.

► Click here if you need help locating the table

```
In [38]: tesla_revenue = pd.DataFrame(columns=['Date', 'Revenue'])

for table in beautiful_soup.find_all('table'):
    if ('Tesla Annual Revenue' in table.find('th').text):
        rows = table.find_all('tr')

        for row in rows:
            col = row.find_all('td')

            if col != []:
```



```

date = col[0].text
revenue = col[1].text.replace(',', '').replace('$', '')

tesla_revenue = tesla_revenue.append({"Date":date, "Revenue":revenue})

```

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

```
In [39]: tesla_revenue["Revenue"] = tesla_revenue['Revenue'].str.replace(',', '\$', "")
```

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

```
In [40]: 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.

```
In [41]: tesla_revenue.tail()
```

```
Out[41]:
```

	Date	Revenue
8	2013	2013
9	2012	413
10	2011	204
11	2010	117
12	2009	112

## 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`.

```
In [42]: gamestop = 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.

```
In [43]: gme_data = gamestop.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.

```
In [44]: gme_data.reset_index(inplace=True)
gme_data.head()
```

```
Out[44]:
```

	Date	Open	High	Low	Close	Volume	Dividends	Stock Splits
0	2002-02-13	1.620128	1.693350	1.603296	1.691667	76216000	0.0	0.0
1	2002-02-14	1.712708	1.716074	1.670627	1.683251	11021600	0.0	0.0
2	2002-02-15	1.683250	1.687458	1.658002	1.674834	8389600	0.0	0.0
3	2002-02-19	1.666418	1.666418	1.578047	1.607504	7410400	0.0	0.0
4	2002-02-20	1.615920	1.662210	1.603296	1.662210	6892800	0.0	0.0

## 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`.

```
In [45]: url = 'https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/IBMDeveloperSkillsNetwork-PY0220EN-SkillsNetwork/labs/project/stock.html'
html_data = requests.get(url).text
```

Parse the html data using `beautiful_soup`.

```
In [46]: beautiful_soup = BeautifulSoup(html_data, '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 using a method similar to what you did in Question 2.

► Click here if you need help locating the table

```
In [47]: gme_revenue = pd.DataFrame(columns=['Date', 'Revenue'])

for table in beautiful_soup.find_all('table'):
    if ('GameStop Annual Revenue' in table.find('th').text):
        rows = table.find_all('tr')
```

```

for row in rows:
    col = row.find_all('td')

    if col != []:
        date = col[0].text
        revenue = col[1].text.replace(',','').replace('$','')

        gme_revenue = gme_revenue.append({"Date":date, "Revenue":revenue},

```

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

In [48]: `gme_revenue.tail()`

Out[48]:

	Date	Revenue
11	2009	8806
12	2008	7094
13	2007	5319
14	2006	3092
15	2005	1843

## Question 5: Plot Tesla Stock Graph

Use the `make_graph` function to graph the Tesla Stock Data, also provide a title for the graph. The structure to call the `make_graph` function is `make_graph(tesla_data, tesla_revenue, 'Tesla')`. Note the graph will only show data upto June 2021.

In [49]: `make_graph(tesla_data, tesla_revenue, 'Tesla')`

## 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.

```
In [51]: 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

## 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.