

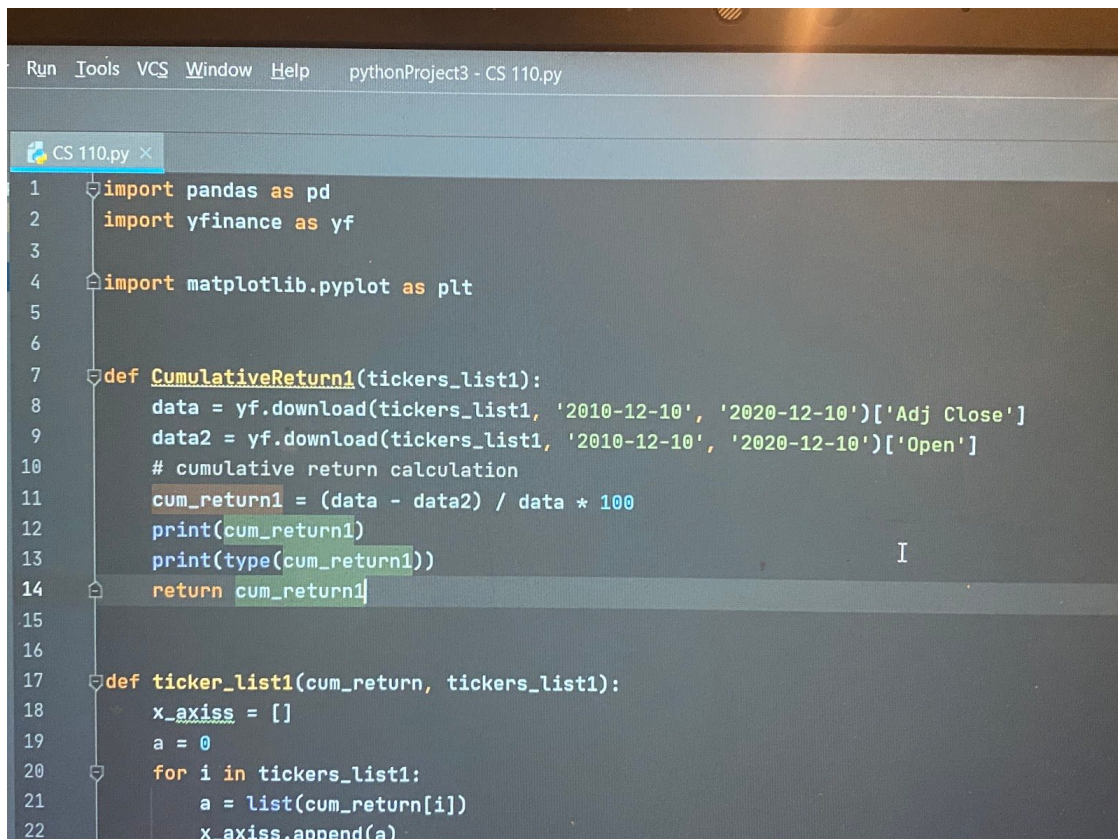
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Professor RyanCS 110 Project

CS 110 project report

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Cumulative Stock Returns



The image shows a screenshot of a Python IDE window titled "pythonProject3 - CS 110.py". The code is written in a dark-themed editor with line numbers on the left. The code defines two functions: `CumulativeReturn1` and `ticker_list1`. `CumulativeReturn1` takes a list of tickers and returns a dictionary of cumulative returns. `ticker_list1` takes the dictionary and a list of tickers, and returns a list of lists representing the cumulative returns for each ticker.

```
1 import pandas as pd
2 import yfinance as yf
3
4 import matplotlib.pyplot as plt
5
6
7 def CumulativeReturn1(tickers_list1):
8     data = yf.download(tickers_list1, '2010-12-10', '2020-12-10')['Adj Close']
9     data2 = yf.download(tickers_list1, '2010-12-10', '2020-12-10')['Open']
10    # cumulative return calculation
11    cum_return1 = (data - data2) / data * 100
12    print(cum_return1)
13    print(type(cum_return1))
14    return cum_return1
15
16
17 def ticker_list1(cum_return, tickers_list1):
18     x_axiss = []
19     a = 0
20     for i in tickers_list1:
21         a = list(cum_return[i])
22         x_axiss.append(a)
```

```
CS 110.py x
23     print(len(x_axiss))
24     return x_axiss
25
26
27 # [[1],[2].....]
28
29 def main():
30     tickers_list1 = ['AAPL', 'AMZN', 'MFI', '^GSPC', 'VGT', 'XLK', 'IYW']
31     cum_return1 = CumulativeReturn1(tickers_list1)
32     x_axiss1 = ticker_list1(cum_return1, tickers_list1)
33     Year = pd.read_csv('AAPL.csv')
34     year = list(Year["Date"])
35     for i in range(len(x_axiss1)):
36         plt.plot(year, x_axiss1[i], label=tickers_list1[i])
37     plt.legend()
38     plt.title("Returns", fontsize=16)
39     plt.ylabel("Cumulative Returns", fontsize=14)
40     plt.ylim(-100, 100)
41     plt.xlabel('Year', fontsize=14)
42     plt.xticks(rotation=90)
43     plt.grid()
44     plt.show()
45
46 CumulativeReturn1()
```

```
42     plt.xticks(rotation=90)
43     plt.grid()
44     plt.show()
45
46
47 main()
48
CumulativeReturn1()
```

CS 110 x

Date	AAPL	AMZN	IYW	...	VGT	XLK	^GSPC
2010-12-10	-15.592674	0.421359	-10.493206	...	-12.280720	-17.334147	0.528059
2010-12-13	-16.894755	-1.193688	-11.616832	...	-13.611635	-18.363164	-0.166072
2010-12-14	-16.442930	-0.195468	-11.011463	...	-13.046286	-17.474216	-0.020135
2010-12-15	-15.791505	1.053714	-11.133992	...	-13.048204	-17.989517	-0.514072
2010-12-16	-15.864017	1.381707	-10.233469	...	-12.497952	-17.614300	0.525399
...

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Windows taskbar icons: File Explorer, Mail, PC, Spotify, etc.


```
41 plt.xlabel('year', fontsize=14)
42 plt.xticks(rotation=90)
43 plt.grid()
44 plt.show()
45
46
47 main()
48
```

CumulativeReturn1()

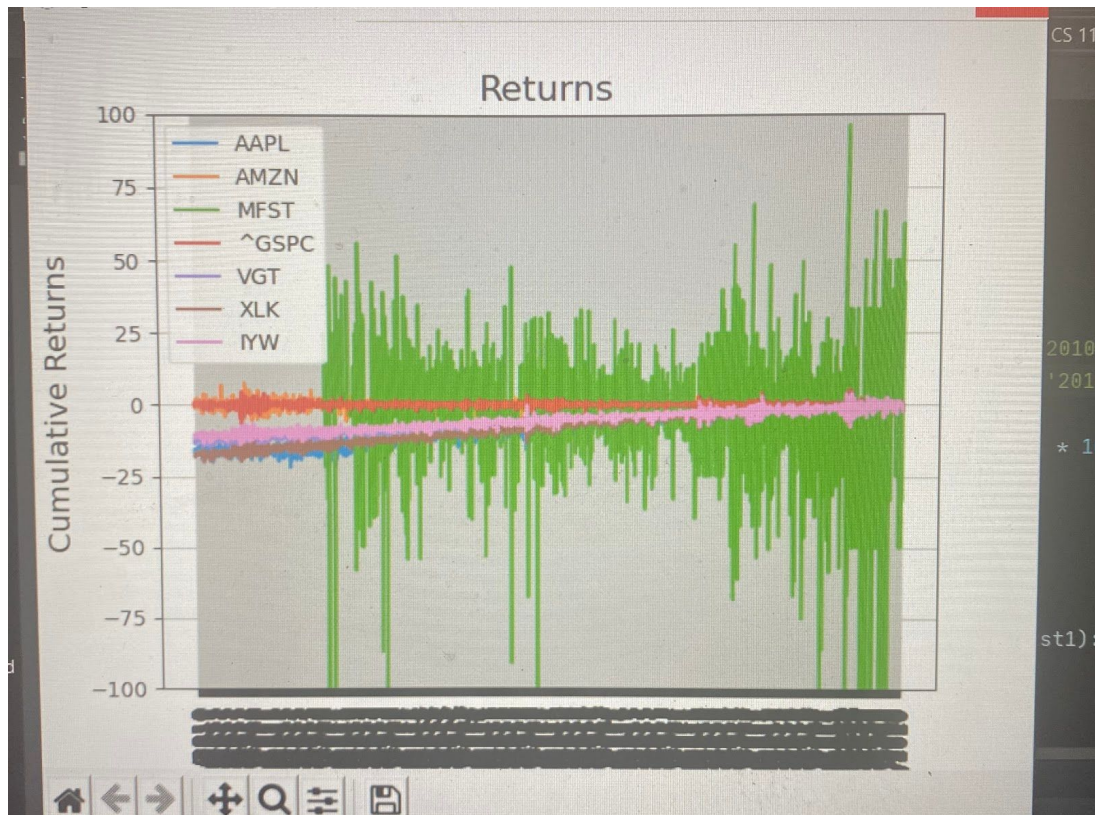
CS 110 x

2020-12-04	-0.286297	-1.126608	0.586968	...	0.889672	0.848937	0.761808
2020-12-07	1.163638	0.048132	0.085332	...	0.210189	0.229431	-0.075028
2020-12-08	0.008035	0.578799	0.348289	...	0.479510	0.417947	0.518602
2020-12-09	-2.258170	-2.051735	-2.300098	...	-2.121408	-1.889376	-0.902846

[2517 rows x 7 columns]
<class 'pandas.core.frame.DataFrame'>
1

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Section 1: The code represents the cumulative stock returns of various trending technology stocks within and out of the S&P 500. The stocks being analyzed consist of Apple, Amazon, Microsoft, Vanguard technologies, SPDR technology sector, Ishares US technology, and the S&P 500. The graph represents the cumulative returns each year for the last ten years ranging from december 10 2010 to december 10 2020. The code first lists the information that needs to be imported in order to analyze the stocks statistics such as the opening and closing prices of each of the 7 stocks. Yahoo finance allows for the historical data of each stock's statistics to be manipulated and pandas allows for that manipulation to occur to result in the cumulative return for a ten year period. The matplotlib then allows for manipulation of the graph and the title and axis labels.

Section 2: The audience of my program would be any typical investor, typically for the long term side that is intrigued by the technology sector. They would also include a typical follower of the stock market or news to see how our technology sector is responding in today's market. Additionally, the user of my prrogram could be a headgefunder of some private equity firm who would give stock advice to others using these statistics on Cumulative Return.

Section 3: First, the datasets were imported using yahoofinace, which is how using the stock symbols will result in a 5 column table of historical data for each stock used. I used multiple functions that I would then call back to the main function for Cumulative Returns over a ten year period. The Cumulative Return had to first be defined outside the main function to be called back. I needed to identify the opening and closing prices because the cumulative return is based on taking the difference of the opening and closing and dividing it by the close, which is then run

in a for loop for the time frame the return is being analyzed over. Afterwards, the calculation for the cumulative return that needs to be repeated for each stock is then defined by doing the new minus original all over the new price times 100, which are defined in data 1 and 2. Afterwards, the cumulative return needs to be printed and then returned to get the table of information. This table represents the cumulative return as a percentage for each day over the ten year timeframe. Next, the time frame needs to be defined for the cumulative return process to be run in a for loop and repeated for each of the 7 stocks. The append function is then used during the ticker function to modify a list within the list of ticker stocks, so the return percentage is inputted into the list of tickers. Lastly, the main function is then defined as well as the ticker list and the cumulative functions are called back to the main function in the beginning of the main function.

Additionally, since the date is not shown when importing the dataframe, a stock csv file was imported and the year was isolated from the dataset. Furthermore the x_axis which represents the cumulative return process, is then used in a for loop for the main function because each stock will be plotted in the x axis and that process needs to be repeated. Finally, the margins are then adjusted using the tylim function and the graph is then shown using plot.show. The plot then reveals that the stocks outside the S&P 500 have a similar trend of return going from negative to roughly a 0-5% gain in december of 2020. Inside the S&P, amazon and apple show a similar trend of a small positive cumulative return where microfost is very volatile most likely due to the price of the stock being lower than the others, therefore having a bigger percentage change even for a small price change.

Section 4: There were multiple challenges that I faced during this project. For instance, the Date variable was not showing from the historical data, so I solved that by importing a csv file for just one of my stocks to then call the “Date” function into my main function. Also, the process of dividing the program into multiple programs was difficult, but I solved this by dividing my stocks into ones in the S&P and ones that were not to keep it more organized.

Section 5: There are multiple features of my program that can be improved on and enhanced. For example, the maximum and minimum growth for each stock can be pinpointed to see if there is any commonality in where the largest jumps in the positive or negative direction are occurring in terms of the month. Also, the code could be improved by comparing companies outside of the tech sector and see the pattern of return they have and write an if else statement to see if they both had positive gains or negative gains for that month, or they were different in terms of positive or negative for cumulative return.