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CS-110 Final Project

**Section 1:**

Chart, line chart

Description automatically generatedMy program analyzes the stock price of Microsoft and Apple, the #2 and #1 ranked companies in the S&P 500 index, respectively. It offers an input to the user, asking whether he or she wants to see the closing price, the average of the open and closing prices, or the difference between the high and low price of that day. Based on what the user types, the program will recognize that and display the graph accordingly. I created two classes: Apple and Microsoft, and I created two functions within each class, which are the same. One function displays the stock price in a ‘normal’ time, and the other displays the price during the pandemic. I defined the normal time as the beginning of 2019 leading up to January 31, 2020, which was the day that President Trump declared the pandemic a public health emergency. This news would have most likely shifted the economy into a panic and had a severe negative impact, so I decided to split the time periods in this way. I defined the pandemic time as January 31 onward until present day, the main time frame in which the economy suffered its losses. I will attempt to discover which company, Apple or Microsoft, performed better during the pandemic, if at all either did. In terms of the graph, the font size on the x-axis of the graph is reduced to two, as it is very condensed on the image. In addition, since Apple recently conducted a 4:1 stock split, the share price has been adjusted to reflect that by Yahoo Finance itself.

Apple Closing Price (Normal)

Chart, line chart

Description automatically generated

Apple Open/Close Average (Normal)

Chart

Description automatically generatedApple High Minus Low (Normal)

Chart, line chart

Description automatically generatedChart, line chart

Description automatically generatedApple Closing Price (Pandemic)

Apple Open/Close Average (Pandemic)

Chart, histogram

Description automatically generatedApple High Minus Low (Pandemic)

Chart, bar chart, line chart

Description automatically generated

Microsoft Closing Price (Normal)

Chart

Description automatically generatedChart, line chart

Description automatically generatedMicrosoft Open/Close Average (Normal)

Microsoft High Minus Low (Normal)

Chart, histogram

Description automatically generatedMicrosoft Closing Price (Pandemic)

Chart, histogram

Description automatically generatedMicrosoft Open/Close Average (Pandemic)

Chart, histogram

Description automatically generatedMicrosoft High Minus Low (Pandemic)

Chart

Description automatically generated

Apple vs. Microsoft (Normal and Pandemic)

**Section 2:**

The target audience for my program would be in the financial world. An analyst who is looking at the profitability of growth stocks in the S&P 500 and the ability for them to weather the pandemic’s financial turmoil would use my program to see which companies are superior in that respect.

**Section 3:**

To collect the data, I went to Yahoo Finance and looked up the stock ticker that I needed. Under ‘Historical Data’, there was an option to download a csv file of any time period that one needs. I changed the time to 1/2/2019 until 11/24/2020 and downloaded everything. To read the data obtained from Yahoo Finance, I imported the csv library, and to graph and display the functions, I imported the pyplot function from the matplotlib library. To open the files in the program, I defined variables globally that were the detailed directory for each of the csv files on my computer, and I used the ‘with open()’ method to read the file, stored for each company in their respective variables. I separated Apple and Microsoft into two classes and defined essentially the same functions in each class. Both functions would graph the closing price, open/close average, or the change in high and low prices, upon request for an input from the user. The only difference between the functions is that one graphs the variable for the normal time period and the other graphs it for the time of the pandemic. In addition to the functions in the classes, I had one globally defined function that graphed only the closing price, but of both Apple and Microsoft for the entire time period. To graph the functions, I created a list for the date and a list for the other variable (CP, OCA, HLC). Using a for loop, I had the program read and analyze each line of the csv file. Depending on the function, (normal vs. pandemic) it only used a certain number of dates. Before reading the file, however, the user receives an input command, asking it to input ‘CP’ for closing price, ‘OCA’ for the open/close average, and ‘HLC’ for the change in high and low prices. Depending on what the user inputted, I had a series of if-statements direct the program to input the proper dates for that function as well as the variable chosen.

**Section 4:**

The major challenge in my design was finding a way to group the functions in a way that made sense. In the end, I split the functions by company and by time period, creating classes for each company and a separate function for both time periods. The only other challenges, which were minor compared to this, was figuring out the cutoff for each of the time periods and keeping track of which functions played which role. Finding the cutoff involved reading the csv file manually and finding a logical place to divide it into two periods. After that, I had to write each function in each class carefully to make sure that I didn’t accidentally have the wrong time period in the wrong function, graph the wrong company’s trend, or have a mismatched title.

**Section 5:**

This program only analyzes the stock price variations of Microsoft and Apple, which are the top two companies in the S&P 500 index. For a senior design project, if I were to use this as a base, I may include all of the companies in the S&P 500. This would become very large, so instead of having classes by company, I would have classes by sector (Healthcare, Consumer Goods, Energy, etc.). Each function in the class would then represent a company in that sector, and they would all perform in the same way for their data, perhaps having a separate sub-function to check for the time period and another to check for the variation on the stock price. I would ask the user to input the number of companies they want to compare, and after that, the company name or ticker, which time period they would like to see, and the variation on the stock price. It would then display a graph of the selected company, time period, and type of price as well as a function of the S&P 500 to reflect the general market.

**Conclusion:**

When analyzing the graphs, I compared the graphs of each type of price and time period. (Ex: ‘Apple OCA – Pandemic’ to ‘Microsoft OCA – Pandemic’). For all the graphs, I found that, ignoring the inherent difference in share price between Apple and Microsoft, the lines were equidistant for most, if not all, the time displayed, meaning that for both time periods, (Normal and Pandemic) the changes in the market had essentially the same effect on both Apple and Microsoft. This pattern can be best seen in the graph of the closing price during both periods directly above. In terms of the graphs of the difference in high and low share price, both Apple and Microsoft appeared to shift wildly between multiple days, regardless of the pandemic. Therefore, I concluded that there appears to be no visible or significant difference in one company’s performance over the other with the arrival of the COVID-19 pandemic.