

# Deliverable 2

## Motivation

We see the daily ups and downs of the market and imagine there must be patterns and through this project, we wanted to collect data from the markets and analyze a myriad of different dates/times and examine the current prices, and based on the data collected/analyzed forecast the future prices of selected stocks (Microsoft, Apple, Tesla, Johnson & Johnson, Nvidia, Facebook). Based on our predictions, we use our paper trading account to buy/sell our stocks at the price we deem will give us the best results. Through this we will be able to analyze our predictions by evaluating our short term trades to see how effective technical analysis is.

## Dataset and Representation

In order to visualize our data, one of the categories in technical analysis, we needed to collect the most recent updated stock information for our companies (Microsoft, Apple, Tesla, Johnson & Johnson, Nvidia, Facebook). In order to do this, we collected our data from Yahoo Finance by using the pandas datareader, which assisted us in data storage and analysis. Once the data was grabbed, we were able to specify the time periods we wanted to analyze at first, thus we took the past 5 years worth of stock data from our chosen companies.

```
MSFT = dr.data.get_data_yahoo('msft',start='2015-01-01', end='2020-11-20')
AAPL = dr.data.get_data_yahoo('aapl',start='2015-01-01', end='2020-11-20')
TSLA = dr.data.get_data_yahoo('tsla',start='2015-01-01', end='2020-11-20')
JNJ  = dr.data.get_data_yahoo('jnj',start='2015-01-01', end='2020-11-20')
FB   = dr.data.get_data_yahoo('fb',start='2015-01-01', end='2020-11-20')
NVDA = dr.data.get_data_yahoo('nvda',start='2015-01-01', end='2020-11-20')
```

Once the data are collected, we now have access to a bunch of features in our dataset that allow us to extract and visualize different aspects of our dataset. Features we have access to are the

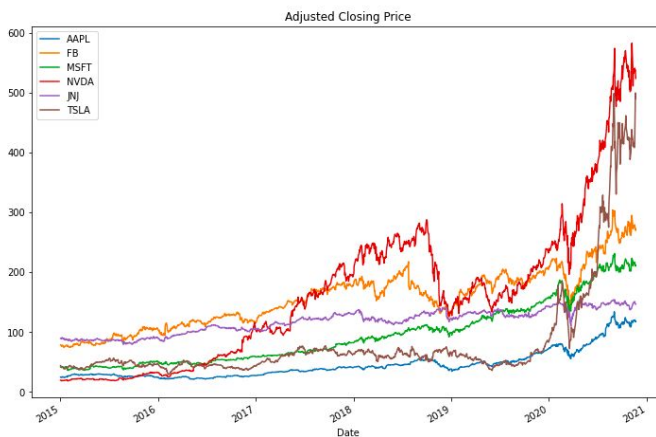
high and low price, the open and close price, the volume traded, and the adjusted close price all for a specific day.

Date	High	Low	Open	Close	Volume	Adj Close
2020-11-16	120.989998	118.150002	118.919998	120.300003	91183000.0	120.300003
2020-11-17	120.669998	118.959999	119.550003	119.389999	74271000.0	119.389999
2020-11-18	119.820000	118.000000	118.610001	118.029999	76322100.0	118.029999
2020-11-19	119.059998	116.809998	117.589996	118.639999	74113000.0	118.639999
2020-11-20	118.769997	117.290001	118.639999	117.339996	73391400.0	117.339996

A few charts that allowed us to visualize and analyze the charts and patterns:

```
#plot stocks and their Adjusted Closing Price during start and end dates
AAPL['Adj Close'].plot(label='AAPL',figsize=(12,8), title = 'Adjusted Closing Price')
FB['Adj Close'].plot(label='FB')
MSFT['Adj Close'].plot(label='MSFT')
NVDA['Adj Close'].plot(label='NVDA')
JNJ['Adj Close'].plot(label='JNJ')
TSLA['Adj Close'].plot(label='TSLA')
plt.legend()
```

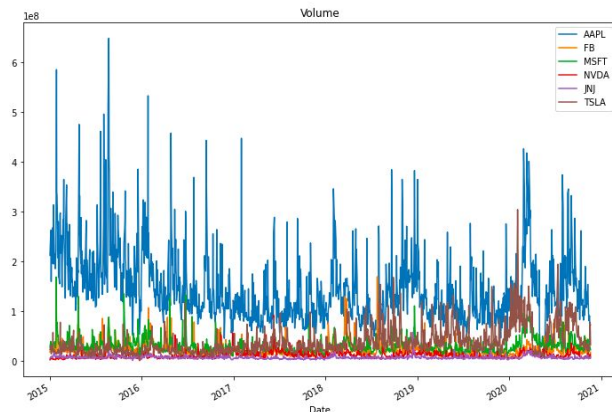
<matplotlib.legend.Legend at 0x123408410>



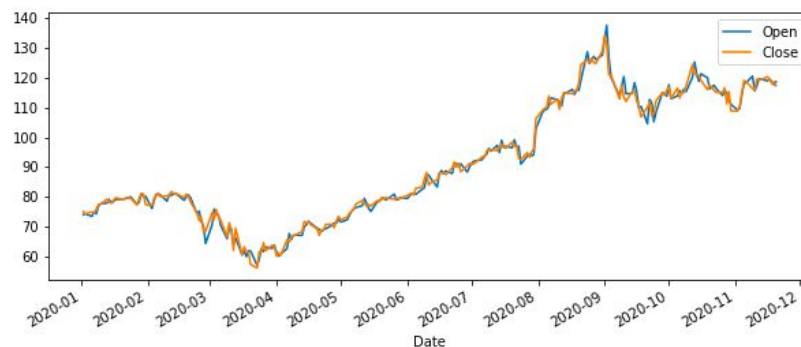
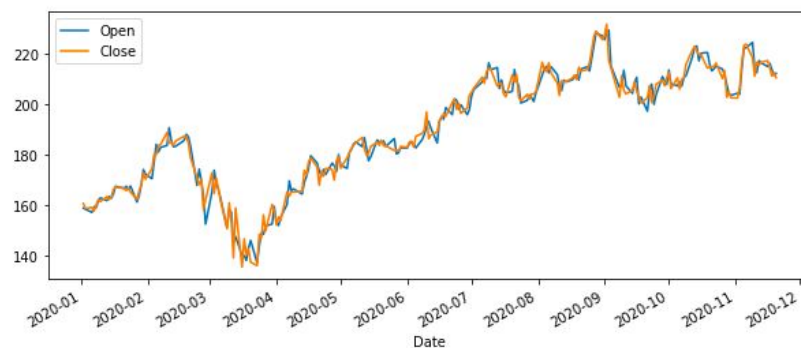
This line plot visualizes the adjusted closing price of the stocks to help identify any trends we may deduce just by looking at it. We can also identify patterns from the charts like head and shoulders, ascending triangle, and more; these are just different ways of anticipating price movements just by looking at a chart alone with no indicators.

```
#plot stocks and their volume traded during start and end dates
AAPL['Volume'].plot(label='AAPL',figsize=(12,8), title = 'Volume')
FB['Volume'].plot(label='FB')
MSFT['Volume'].plot(label='MSFT')
NVDA['Volume'].plot(label='NVDA')
JNJ['Volume'].plot(label='JNJ')
TSLA['Volume'].plot(label='TSLA')
plt.legend()
```

<matplotlib.legend.Legend at 0x1240b3290>



This chart plots the volume traded for our stocks during the dates we classify, and this gives us a better understanding of how much shares are being traded, the more the better for our stocks.



These charts plot the open and close price for our stocks, and this allows us to analyze any major price changes that occur in the same market day. This helps us indicate whether the price we will buy a stock at will stay in the same range for most of the day.

In addition to analyzing the chart patterns with our visualizations, we used technical indicators though the TA-Library (TA-lib) available to us in python which includes 150 + indicators to help us predict stock direction.

The indicators we used to help us predict price movements were Moving Averages, Exponential Moving Averages, Moving Average Convergence Divergence, Relative Strength Index, and Volume traded. Each one of these indicators on their own can help predict stock direction but they each do it in their own unique way. Below is an example of Microsoft stock price and the indicators for the duration we choose. We also charted these for each stock to visualize trends better.

	High	Low	Open	Close	Volume	Adj Close	macd	macd_signal	macd_hist	ma10	ma30	ma50	rsi
Date													
2020-11-16	217.740005	214.520004	214.869995	217.229996	24953300.0	216.662766	1.313277	0.849160	0.464117	216.495998	214.061666	210.9072	53.853759
2020-11-17	217.679993	214.080002	216.100006	214.460007	24154100.0	213.900009	1.162123	0.911752	0.250370	217.298999	214.346666	211.1432	50.734074
2020-11-18	215.169998	210.929993	213.649994	211.080002	28372800.0	211.080002	0.760824	0.881567	-0.120743	216.767999	214.388333	211.1390	47.145217
2020-11-19	213.029999	209.929993	211.380005	212.419998	24792700.0	212.419998	0.544640	0.814181	-0.269541	215.681000	214.449666	211.2800	48.694710
2020-11-20	213.289993	210.000000	212.199997	210.389999	22829100.0	210.389999	0.207121	0.692769	-0.485648	214.348000	214.268999	211.4072	46.472045



## Questions

1. Is the process of Technical Analysis beneficial in determining future stock price/performance?

Yes, technical analysis is beneficial in determining future stock price/performance. By analyzing and reading charts to identify trends in the market we were successfully able to have a positive return of close to \$5000 (3%) on our paper trading account in the first week of using our technical indicators to predict stock direction. Although technical analysis doesn't always work 100% of the time, this is evident because we used the same strategies and our account lost our initial returns and resulted in us having only 0.04% (\$70) return. There is still some time to increase the account!

FB +200	269.80 +0.10 +0.04%	+200	\$20.00	(\$367.00)	(\$367.00)
JNJ +150	146.55 +0.19 +0.13%	+150	\$28.50	\$532.00	\$532.00
MSFT +300	210.45 +0.06 +0.03%	+300	\$18.00	(\$20.00)	(\$20.00)
NVDA +250	523.51 0.00 0.00%	+250	\$0.00	(\$4,240.00)	(\$4,240.00)
TSLA +5	490.50 +0.89 +0.18%	+5	\$4.45	\$293.50	\$293.50
Cash		—	—	—	—
Totals:		—	\$70.95	(\$3,801.50)	(\$3,801.50)

2. Does it boil down to fundamental analysis or mixture of the two?

Performing well in the market requires a mixture of both fundamental analysis and technical analysis. As fundamental analysis focuses on a lot of the real-life events that may not be recognized from a chart. Some of these include economic data, monetary policies, management quality, and annual reports.

Technical analysis, which focuses mainly on the price trends of a stock, fundamental analysis seeks to determine the fair market value of that security and where it should be trading.

Some fundamental analysis indicators include: Book Value per Share, Cash and Cash Equivalents per Share, Debt-to-Equity Ratio, Free Cash Flow, Earnings Report. There is no right or wrong system in the markets, which is evident since there are so many different factors that determine a stock's direction on any given day. But one thing for certain is that a combination of both is needed to well equip one's self in having a proper risk tolerance and increasing probabilities, given the subjective nature of both technical and fundamental analysis. In addition, most successful traders take into consideration a wide range of technical and fundamental factors before making the decision to buy or sell a stock.

### 3. How effective is technical analysis?

Technical analysis is very effective depending on the person who is using it. As it is very subjective in nature, TA allows for multiple interpretations to be deduced based on the same data represented. Two people can look at a chart visualizing the adjusted closing prices for a stock and both individuals can walk away from the chart with two different predictions and analysis on what they think the stock would look like next. Technical analysis is very probabilistic, and to deem it effective requires one to associate their findings to the successes of technical analysis. A mixture of both fundamental and technical analysis is needed to best prepare oneself for proper risk and allocation management. Based on our results on just using technical analysis for our dataset, we deem it to be effective, but we believe if we mixed in fundamental analysis our predictions would be more accurate with our findings, because at times there were price movements that we did not anticipate based on historical price data; but if we used fundamental analysis we would've been able to associate those movements with news articles that came out for that stock, or our current environment with recent covid vaccines news which was a catalyst

for the market. As you can see, technical analysis is effective to an extent in which you need more economic data to justify price changes.

4. Is the history of stock prices an indicator for future stock prices/movement?

Absolutely, the history of stock prices is an indicator for future price movements as it is one of the main features used in technical analysis. By analyzing the past stock prices one can use different indicators to help quantify future price movements and justify claims. Although you can use it to anticipate the direction of a stock, it doesn't necessarily provide an accurate representation of the movement because the market can act irrationally at times disregarding the past stock prices. So the history of stock prices is definitely an indicator for future stock price movements, but to an extent; even the Security and Exchange Commission warns that past performance isn't an indicator of future performance.