Data Wrangling

We used the AlphaVantage API in order to obtain real-time stock data. We made queries to capture data for six different stocks from the time of the stock’s inception. We captured the stocks’ price data through a time series daily adjusted module which returns the open, close, high, low, volume, and adjusted close prices of an array of dates. We then used a variety of other modules to capture SMA, EMA, STOCH, RSI, MACD statistics. All of this data was stored into a python dictionary and then outputted into json files. The json files are read in with javascript and displayed using D3.

SMA

Simple moving average (SMA) is a statistic of a stock that gives an indication of a time period’s trend in the upward or downward direction. The process of calculating a simple moving average is summing all of the closing prices in a certain time interval and dividing by the number of prices. It is a value that can be tweaked by analysts in order to smooth out the data. As the time interval increases, the SMA shows a much smoother representation of the source data whereas decreasing the time interval shows a “closer” representation of the source data.

SMAs are excellent indicators of upward and downward trends in data and analysts employ different trading techniques utilizing SMAs. One popular trend is the death cross where the fifty day SMA crosses below the two hundred day SMA. It is considered to indicate a downward trend and analysts are inclined to sell.

EMA

Exponential moving average (EMA) is a similar statistic to SMA but more heavily weights recent prices in the average. In order to calculate an exponential EMA, the SMA is first calculated and used as its initial value. For each day in the time interval, a weighting factor is found and a percentage of the last EMA value is added to the current EMA value.

Because of the addition of heavy recent price weights, the EMA is more sensitive to the source data and will not smooth out the data as well as the SMA.

STOCH

Stochastic Oscillator (STOCH) is a statistic that gives analysts an indication of the momentum of a particular stock. It is calculated by subtracting the lowest price over a time interval from the current close and then dividing this result by the range of the time interval. A simple moving average over a specified time interval is applied to these percentages to generate the statistic. This statistic shows when a stock is making large movements in the upward or downward direction.

There are two version of the STOCH statistic: slow and fast. The fast version is the statistic described above without the simple moving average whereas the slow version implements the smoothing factor (SMA).

MACD

Moving average convergence/divergence is another statistic that gives an indication of momentum. It does so by showing the relationship between two different moving averages. The 26-Day EMA is subtracted from the 12-Day EMA and this is the base algorithm to find the MACD statistic of a stock. To find the MACD signal, an EMA is applied to the MACD statistic. Analysts plot the both the MACD statistic and the MACD signal on the same plot and check to see where crossovers occur. When the signal passes above the MACD statistic, it indicates that upward trends are likely in the future.

RSI

Relative strength index is yet another momentum indicator and evaluates how “strong” a stock has performed over a specified interval. The relative strength is calculated by finding the average gain/loss of a stock’s price over the time interval. The equation to calculate the RSI is presented below.

RSI = 100 - 100 / (1 + RS)

Because RSI values can only range from 0-100, certain values are marked as thresholds to indicate when a stock is being overbought or oversold. Analysts commonly use the value 70 for this indication.