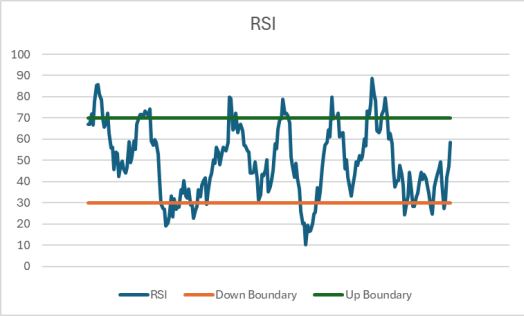
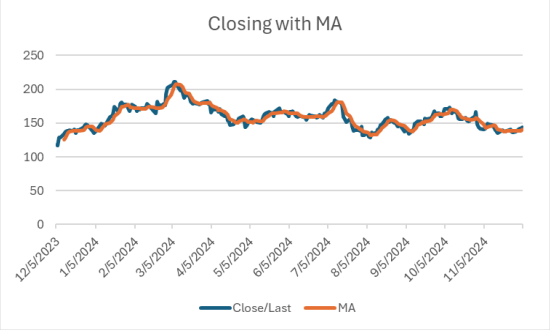
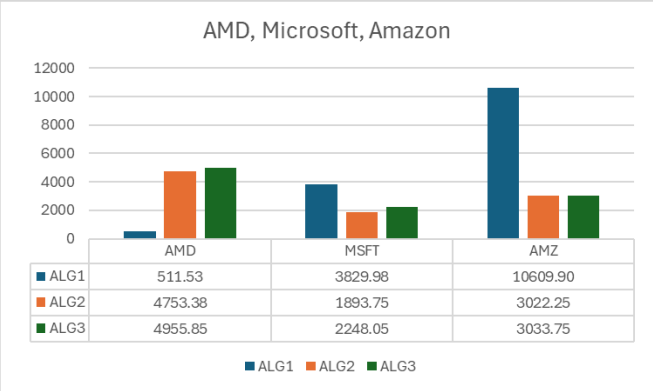
The stock market is a turbulent and sometimes unpredictable system seen by some as gambling, and by others as a viable path for income generation. Although there is a pinch of luck when it comes to investing, knowing when to buy, sell and hold will be the difference between making a profit or losing money. In our project, we designed a “Stock Bot” which by using calculated indicators such as relative strength index, moving average, and other heuristics would be able to determine when to buy, sell and hold. For this project we had to write three different algorithms and compare their performance on different historical data from a variety of stocks, each data point being analyzed by our Stock Bot in order to determine the next best move. Like mentioned above, our Stock Bot uses two very important calculated indicators to determine its next action, relative strength index (RSI) and moving average (MA). These two indicators are typically used by actual investors to help them determine when to buy or sell, which is exactly what our Stock Bot is doing. The RSI is a momentum indicator, it uses a previous set amount of data points, calculates the average up and average down, and using a formula provided in the assignment’s parameters determines RSI (Investopedia). The RSI is on a scale from 0 to 100, and typically has arbitrary parameters ranging from 30 to 70, or 20 to 80. In the picture on the left which shows the RSI for AMD’s stock over a one year period, we use a range from 30 to 70. On any given data point the RSI is calculated, and if it happens to be above the larger parameter, it’s a good indicator as to when you should sell since it helps predict stock will go down. If the RSI is below the smaller indicator, you should buy since stock is cheap and is predicted to go up soon. In this project we not only had to utilize RSI, but had to learn how it actually works and the best way to use it. The MA was also used in cahoots with the RSI, the MA is an indicator which helps investors determine the direction of a trend, it uses “support” and “resistance” to help indicate whether you should enter or exit a trade (Corporate Finance Institute). The figure on the right shows the daily MA for AMD’s stock, as you can see the MA typically follows close to our stock since it is an average of a select amount of previous data points. For our project, we used a 5 data point moving average for all of our testing. Our Stock Bot has three different algorithms, the second and third both primarily rely on RSI and MA, while the first algorithm does not. Our first algorithm is very simple, it uses whatever starting balance we give it in order to buy as many shares as possible. It then holds onto those shares for the stock’s given time period, and then sells at the very last data point. This is a nice baseline and is also the most riskiest of the three algorithms, as it will not do anything with the stock until the very end. Our second algorithm uses both RSI and MA to determine when to buy and sell. Depending on how high or low these numerics get determines how much stock to buy or sell as well. For instance if the RSI plummets extremely low to let’s say 10, Stock Bot will buy more shares than it would if the RSI went down to only 30. Our third and final algorithm utilizes the same principle as algorithm two, but has some adjustments in order to optimize its performance which were thought of and implemented by me. Algorithm three constantly references the previous data point’s opening value and compares it to the current data point’s opening value. With this information, it calculates the difference between the two with a 25% room for insignificant fluctuations. Before Stock Bot uses





RSI to make a decision, it will use this heuristic to determine if it should buy or sell. For example, if the previous data point's opening was significantly higher than the current data point's, Stock Bot will not sell. If the previous data point's opening was significantly lower than the current data point's, Stock Bot will not buy. This theoretically will prevent Stock Bot from selling or buying an inopportune stock even if the RSI and MA have not adjusted yet. These three algorithms both yielded very interesting results, as you can see from the figure on the left, we used this historical data from AMD, Microsoft and Amazon to test Stock Bot. We started with an initial starting balance of 25,000, with a yearly time frame using daily data points. Every algorithm surprisingly yielded a profit, the significance of each varying from each one. Algorithm one for AMD yielded the lowest profit of only around 500 dollars, but for Microsoft yielded the highest profit of the three algorithms at around 3,800 dollars. For Amazon, algorithm one performed the best out of every test yielding a profit of around 10,000 dollars. These varying profit yields go to show the risk and chance associated with algorithm one, you might score really large, but could also make very little or even lose money. Algorithm two and three produced very similar and safe results for each stock, yielding a smaller yet significant profit every year. What is most interesting however is despite their similarity, algorithm three always yielded a profit slightly larger than algorithm two. This indicates that my algorithm used to determine when to buy, sell or hold could possibly be more effective than simply relying on RSI and MA. It should be noted that many of the values used for our calculated indicators such as the RSI bounds, the MA's time period and my algorithm's error percentage were all arbitrarily picked and could likely be tweaked and optimized better given more research into a specific stock.



Abstract:

This report introduces us to a possible automated alternative to manually investing in stocks, "Stock Bot". Stock Bot uses common calculated indicators used by professional investors such as RSI and MA to calculate the best times to buy, sell or hold. Our Stock Bot utilized three different algorithms in testing, the first of which bought at the beginning of the time period and sold at the end. The second used both RSI and MA. The third used the same principles as the first but included other heuristics implemented by me. The algorithms were all tested using a starting balance of 25,000 over a one year time period with daily data points. Algorithm one yielded varied results, seemingly being based mostly on luck. Algorithm two and three yielded steady and similar results, with algorithm three most notedly always yielding more income than algorithm two.

Work Cited:

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