

## **Role of Student vs. Mentor**

Most of the work on this project was done by the student alone, but the mentor played an advisory role from time to time in guiding the student's overall approach to research and making suggestions on potential directions for the project. Work on the project began in October and the goal is to be completed by February 21<sup>st</sup>.

## **Equipment and Materials**

I used Investing.com as a source of historical stock market data and most of my work was done in Python. Two libraries I used a lot were Statistics and Pandas and I worked within the Visual Studio environment.

## **Technique 1**

The algorithms will be developed using historical data from a large variety of different stocks, ETFs and mutual funds such as the S&P 500 (Qin, 2018). It will use a variety of techniques, notably MA, day-to-day change and, the derivative of this change to determine the direction of price movement. A series of independent algorithms will be developed for further testing, and the entire project will utilize historical data from Investing.com which will be cross verified with other sources. The code to execute the testing of algorithms will be run using python and specifically the Pandas module, as the stocks and their associated data will be inserted into a Pandas data frame for processing. The testing method will allow for rapid testing of strategies on data and also give more flexibility in the type of output we receive. Non-machine learning algorithm development has been previously attempted in a method that was vaguely similar to this project in a paper by Kuo and Chou in 2021, and this is a graph of the performance of their algorithms, which demonstrates the ability to outperform buy and hold with a certain algorithm.

## **Statistical Tests**

I will be using a one sample t-test for means in order to determine whether or not my algorithm has outperformed buy and hold. I will also use a two-sample t-test to compare my algorithms to each other and may potentially use more tests to compare different stock categories to each other by performance to determine if there's a difference in how well algorithms work for certain types of stocks.