

Michael Ward

Honors Thesis Proposal

Understanding the Stock Market through Algorithmic Trading

Reasoning for Thesis

Since its creation, the stock market has played an integral part of the American economy. It has become the basis for investments, with investment professionals working so hard to find the best times to buy and sell. Some of these skilled investors could make great returns but only with dedicated study of market trends and quick buys and sells.

Over the last few decades, computers have revolutionized so many aspects of life. With all the new advancements in computing, it was inevitable that computers would change the stock market. First, computers and the internet allowed stock traders to buy and sell instantly — and from anywhere. But a new concept emerged — at the cross of computer science and investing. This is called algorithmic trading, and uses computer algorithms to determine the proper times to buy and sell stock.

These algorithms can completely revolutionize stock trading — they can trade at the exact moment the prices are optimal, they can time the trades correctly and instantly, they reduce the risk of human error, and most importantly, they run automatically.

For my project, I will learn more about how algorithmic trading works and develop several stock trading algorithms. I will work closely alongside Andrew Brim from Computer Science and Professor Tyler Brough of the Finance and Economics departments. I will also be working with the USU Investing Club, a creation of Andrew Brim, to get real-time feedback on my algorithms from skilled professionals.

This is a key capstone project for my education because it's at a cross between computer science and finance. I am majoring in computer science and minoring in business, with an emphasis in finance. I also have a minor in mathematics, which will come in key in working on algorithms. This project will combine computer science, finance, and mathematics to create a very practical result — a very useful tool for investing.

Fundamental Goal:

To learn algorithmic trading by creating and testing various algorithms with past market data.

Tasks to be completed:

1. I will learn more about how the stock market works. This will include learning when it is optimal to buy and sell and how to best predict the future changes of the stock market. This will help me to develop better algorithms later on.
2. I will learn the basics of algorithmic trading. I will learn how to write a basic algorithm that will interface with the website Quantopian to buy and sell stocks.
3. I will learn proper techniques for trading algorithms and learn how to improve my algorithms.
4. With the help of my professors, I will develop algorithms of my own and continue to research how to create better algorithms.
5. I will continue to test all the algorithms that I have created.
6. I will find a few key algorithms and record them in my report. I will also record several important algorithms developed along the way to show the progress that I made.

Timeline:

February/March 2017: Learn more about the stock market works. Learn the best ideas for when stock is to be bought and sold in order to understand algorithms.

April/May 2017: Create an algorithm to trade stocks and test on the website Quantopian. Learn how to use the website to optimally test my algorithms for effectiveness.

June-August 2017: Continue to learn the basics of algorithmic trading and continue to develop new algorithms.

September-December 2017: Continue testing my algorithms, using the performance of my current algorithms to teach me how to improve them.

January-April 2018: Choose some key algorithms and start writing the report.

Penultimate draft submission: April 1, 2018

Final thesis submission: May 1, 2018

Research Sources:

1. Quantopian. www.quantopian.com. Web. Accessed 1 February 2017.

Quantopian will teach me the basics of algorithmic trading. It includes a forum where people post their algorithm ideas and answer questions. It also includes a way to test an algorithm on past market data. This will be my key source, since it is a website devoted entirely to my topic.

2. Investopedia. www.investopedia.com. Web. Accessed 1 February 2017.

Investopedia will contain guides on investment strategies. While the focus is more on general investing rather than algorithmic trading, learning the general investment strategies is key to learn how to write better algorithms.

3. Robinhood Markets, Inc. www.robinhood.com. Web. Accessed 1 February 2017.'

Robinhood is a key broker site that will allow me to buy and sell actual stocks on the market. I have yet to decide whether I will buy and sell actual stocks in this project. If I do, this broker site will allow me to buy and sell with minimal fees, and will also work well with my algorithms.

4. MarketWatch. www.marketwatch.com. Web. Accessed 1 February 2017.

MarketWatch is a key news website where I will learn more about current market trends and investment strategies. This will keep me up to date with current market trends, which will help me to

5. StockTrading www.stocktrading.net. Web. Accessed 1 February 2017.

Stocktrading.net is another key market news website. This website will provide me with articles on good investment strategies. This will provide me with key strategies to help me to improve my stock algorithms.

Final Product:

The final product will consist of a written report. This report will include details on the learning process of using the stock market and writing algorithms for trading. It will also contain the code of many of my algorithms, from the early attempts to the final product. I will include graphs with each algorithm to show how it performed over a period of time.