Thesis Project Portfolio

Artificial Stock Analyst: Using Machine Learning to Create a Holistic Approach to Stock Analysis

(Technical Report)

Algorithmic Trading: Balancing Automation and Regulation

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

The term algorithm hides the immense complexities of the actual processes and systems behind the code. The stock market is predominantly controlled by these automated programs with algorithmic trading being the largest key player in the industry. Understanding and tracking these complexities mitigates the potential for harm, something especially important for the stock market, a complex financial web that impacts the lives of everybody. Additionally, the stock market is a major catalyzer for retirement and even a source of income for stock traders. Comprehensive analysis and regulation of algorithmic trading is needed to effectively guarantee a fair and healthy stock market that would enhance the lives of all. My technical project focused on developing an artificial stock analyst that would provide free and quantitative stock price predictions. This would improve accessibility of high caliber stock trading tools to better level the playing field between large stock trading firms and average investors. My STS research used the contextualization of Actor-Network Theory to analyze the positives and negatives of algorithmic trading while discussing opportunities to mitigate the downsides.

The technical project adopted a holistic approach to identifying buy and sell signals in stocks contained to the S&P 500, an index that tracks the 500 largest companies in the U.S. market. Limiting the stock analysis to the S&P 500 means the supplemental tool looks to at least replicate market return without exposing users to excessive risk. This proposal looked to mitigate accessibility issues by utilizing free technologies without compromising the robust infrastructure needed to predict stock price movement. Keeping the system low cost meant sacrificing a few features such as the highest quality data and the frequency of computation. Compared to a typical day trading algorithm, the artificial analyst would run calculations on a weekly basis using

Google Firebase as a backend and host. The project proposal could be enhanced through optional payments that would grant access to better data and more frequent backend updates.

My STS research looked at algorithmic trading as a whole and sought to analyze the potential downsides against the benefits. Accessibility remains a large issue that free tools like the artificial stock analyst could help mitigate by lowering barriers to entry. Within the industry, accessibility is still a struggle in terms of company cultures and the resources available to larger versus smaller firms. Further, algorithmic trading is a heavy environmental burden. From the powerful computations running constantly, massive quantities of electricity are consumed; however, additional issues arise because the algorithms ultimately invest in companies. Focusing on financial gain, these algorithms fail to analyze the environmental impacts of companies and could fund companies that have far greater negative effects on the environment or even human rights. Overall, algorithmic trading promotes market health through liquidity and volume, and supplemental tools can help drive investing. As programs become more anthropomorphic and complex, we must continue to monitor the impacts they have they can have on humans and society at large.

Future research should delve deeper into the implications of algorithmic trading. As revealed by ANT, the stock market is a complicated network of various stakeholders with varying degrees of influence and interest. Yet, global stock markets ultimately connect the various industries of the world as the largest pools of money. To maintain a responsible and fair investing environment, the algorithms dominating these markets must be continually monitored. My research provided a starting point for different categories to observe, but given the complexity of this technology, future research must delve deeper into each aspect of risk while identifying other vulnerable points.

I would like to thank my parents and family for letting me ramble on about algorithmic trading. None of this would be possible without their encouragement and support. Additionally, I am grateful to Professors Rider Foley and Caitlin Wylie for their assistance, patience, and guidance. Lastly, I would like to thank all my classmates who endured my drafts and helped my arguments take shape.