Assessing The Impact of AI Agents Influence on Financial Markets
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The aim of my research this summer was to assess the possible influence a group of AI agents could have on the price of a stock. The genesis of my research centered around the GameStop (GME) short squeeze that occurred in early 2021. At the start of 2021, several perceptive retail investors noticed that multiple hedge funds had taken substantial short positions in GME, betting on the continuation of the video game seller's decline. These retail investors realized that if a coordinated effort was made to buy and hold the stock, they could potentially drive up its price, in turn forcing the hedge funds to cover their positions at elevated prices, and inflict significant financial losses. The investors leveraged the coordinated buying capacity of a wide swath of retail investors using online forums like Reddit's r/WallStreetBets, to convince others to buy shares of GME. The central question to my research was whether a group of generative AI agents working towards a common goal could influence the price of a stock in a similar manner by creating posts on social media platforms like Reddit.

I began with the question of whether a true link exists between investor sentiment and stock price. I used the Agent-Based Interactive Discrete Event Simulation environment (ABIDES) to simulate a stock market for my first experiments. ABIDES works to create a stock market simulation by using multiple Agent classes that act in the roles of retail investors. Using this framework I developed a sentiment based agent that would trade based off of sentiment scores. At first I gave the sentiment agent controlled sentiment scores that would fall within a predetermined trend such as an up trend in which sentiments would increase throughout the trading day. I then created a second source of information to feed to other agents in the simulation, in the form of a mean reversion "Oracle" that could inform other agents of outside price information. I could control this oracle to have a positive or negative trend throughout the day, causing the agents to move the price of a given stock up or down. With this setup I was able to prove the efficacy of my new sentiment based agent. If I told the other agents in the simulation to make the stock price go up, and fed the sentiment agent positive sentiment, it outperformed the other agents on average. The same was true for the opposite: during a simulation day with a negative trending price, based only on negative sentiment the sentiment agents outperformed the other agents. I further developed my sentiment agent to look at different text throughout the day, which it in turn scored and traded off of. However this text was also synthetic and the sentiments expressed in it could be controlled.

The second phase of my research was a wider analysis of sentiment's role in the real market. Through literature review, and experiments of my own, I discovered that there was indeed a link between investor sentiment and stock price. I found this link by running experiments analyzing posts posted in the Reddit community r/WallStreetBets during the GME short squeeze and scoring their sentiment using the VADER (Valence Aware Dictionary and sEntiment Reasoner) model. I then compared the smoothed sentiment data to GME price data over the given time frames to see sentiment as a clear trailing indicator of price. My plan is to continue this research into the fall semester where I hope to create generative sentiment models that can create posts which I can in turn feed back into the sentiment agent analysis I developed this summer.