Senior Project Proposal: Predicting Stocks

Using historical data + insider trades + social media

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Overview

We propose to use a mathematical model with use of AI algorithms to predict trends in stocks, using historical trends plus the following data as evidence:

- Insider trades - the publicly available stock trades of Congresspersons and insiders in corporations alike
- Social media sentiment, interpreted by an existing LLM
- Financial news, also interpreted by an LLM

A second algorithm will use the aforementioned predictions to maximize profits.

Usage & Features

The program can be downloaded or compiled from source code.

The program can run automatically if given API access to trading platform to directly trade stocks.

Users might be able to select from different stock-predicting algorithms.

Users will be able to tweak the profit-maximizing algorithm for certainty vs risk, etc. giving users more options and opening up the product to a larger audience

Our target audience would be users in the finance sector as well as those that are financially literate.

Existing Research

Many studies have come out recently using programs to predict stock prices:

- Chakravorty and Elsayed 2025 [https://arxiv.org/abs/2502.08728]
  Comparing ML algorithms for stock price prediction based on insider trading
- Talazadeh and Perakovic 2024 [https://arxiv.org/abs/2410.07143]
  New technique to significantly improve stock market prediction accuracy using financial news and historical data
- Goyal et al 2025 [https://arxiv.org/abs/2508.02089]
  Used Social Media Sentiment for Predictive Algorithmic Trading Strategies.
- Zhou et al 2025 [https://arxiv.org/abs/2504.10078]
  Analyzed expert opinions and sentiment on social media for stock prediction.
- Jing et al 2021 [https://tinyurl.com/4f2x8bza]
  Hybrid model integrating deep learning with investor sentiment analysis for stock price prediction
- Koukaras et al 2022 [https://www.mdpi.com/2673-4001/3/2/19]
  Analysis of twitter sentiment to create a stock prediction model

Hardware & Software

In terms of programming, we plan to code in Python to utilize existing libraries for AI, algorithms, mathematics and statistics.

In terms of processing power, Akash has a virtual private server with upgradable RAM. This server could transmit stock prediction data to local applications, which then carry out the profit-maximizing algorithm.

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Justification: Building on other classes

The project will be a cumulation of what we have learned in several classes throughout our previous semesters such as:

- *Algorithms and Analysis (CMSI 2130)*
- *Artificial Intelligence (CMSI 3300)*
- *Probability and Statistics (MATH 361)*

It will further extend our collective understanding of statistical mathematics, machine learning, AI, and other algorithms, This will further help us develop on our knowledge and gives us a meaningful team experience.

On the other hand, we also hope to gain more experience with statistical and mathematical programming.

Justification: Tools & Technical Difficulty

We collectively possess a deep understanding of Python.

Abdullah has experience in SQL which could be informative in terms of mathematical programming and managing databases. Akash has experience running a virtual private server. Together, these skills can and will be used as a catalyst for success and amplify the quality of our end product.

Thanks to existing research and programs, it is most certainly feasible to complete the project within one semester. Some extra features, such as modifying the algorithm, will depend on how much time is available, but they won't hinder nor would they obstruct the timeframe needed to complete this project.

Justification: Purpose & Interest

All four members of the team are interested in this project, both in its conceptual side and its practical function. Rayane and Akash have minors in math and Abdullah has a minor in statistics. All four members of the team are interested in using AI.

Together, we have an eager and personal interest in building this project and making it work to the best of our abilities.

Thank You