Faculty of Engineering and Applied Science

SOFE 4820U Modeling and Simulation

Project Proposal - Stock Price Prediction

Group Members

Team Member	Student Number
Joshua White	100747854
Faisal Alsheet	100639174
Taimour Arshad	100748446

Problem Statement

Every day millions of transactions result in billions of dollars worth of stocks being traded. Our group aims to use statistical models and simulations to find the optimal time to buy and sell an individual stock to maximize profit and mitigate loss.

Relevance

This approach is relevant to real-world problems in many ways, first the decision-making process; the price prediction model will assist investors in making informed decisions for buying, selling, and holding stocks. Our approach will also help investors manage the risk of investing in the stock market, by applying predictability models to determine the safety of a stock including any fluctuations or downturns, thereby helping to safeguard a user's invested assets and mitigate any risks. By using a prediction model, users will be better equipped to perform market analysis gaining a deeper understanding of what makes an investment safer based on the analysis of stock patterns. Finally, this will provide users with a competitive advantage; having accurate prediction models gives investors an opportunity to outperform competitors as well as generate higher profits.

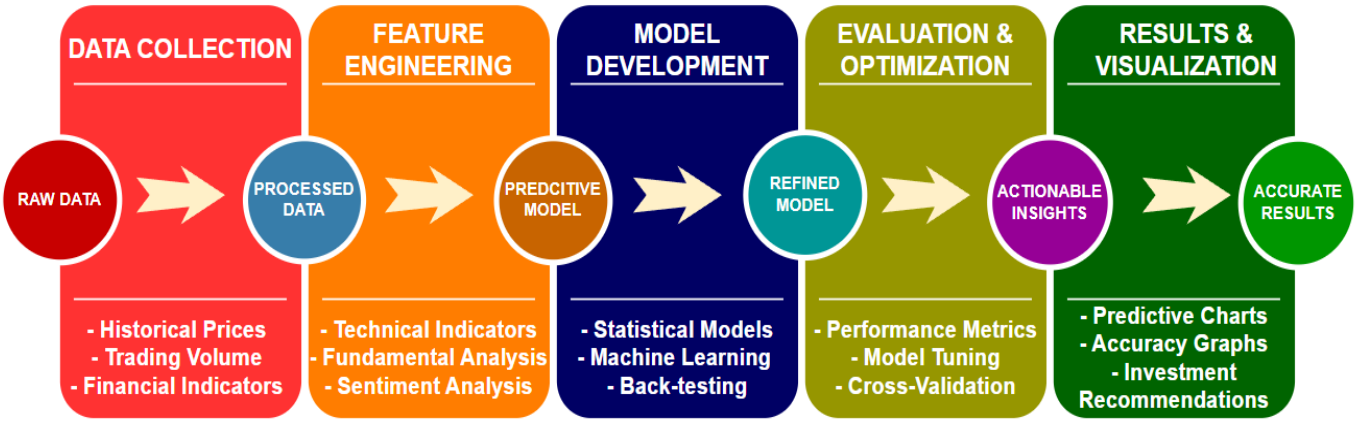
Why It's Interesting

With billions of dollars being invested and traded daily in the stock market, it can be a daunting and confusing investment opportunity. This provides a unique and interesting challenge providing potential investors with the tools required to make mathematically supported decisions about what to buy as well as when to buy or sell it. Our solution will require using a mathematical model to compare the optimal short-term average against the long-term average to determine the direction and profitability of a stock as well as using a predictive model such as a Chi-Squares Test or Markov Chain Process based on the stock's individual history as well as comparable price history. This would allow our group to take the methodologies learnt during lectures and apply them to a real-world application.

Related Approaches

Even though many other approaches exist for stock price prediction, our approach is unique since we are combining statistical modelling methods with simulations. The chosen methods include time series analysis, Markov Chain Process, and a holistic view of stock price dynamics which supports the techniques utilized ensuring that our approach stands out compared to other related approaches in the market.

Sketch



Anticipated Difficulties

Dynamic Data: Financial markets are changing constantly and abruptly. This means that the statistics for these datasets are changing as well and trying to establish patterns or relationships is hard. Models that work in one market, may not work in another market.
Several Factors: The stock market is complex and has numerous variables influencing it. These micro and macro factors include politics, economic conditions, unforeseen events (natural disasters), interest rates, and more. Although it will be challenging, we must account for as many variables as possible.
Data Quality & Availability: We need to find high-quality and accurate datasets to help us train our model. Attempting to find financial data of high quality may be difficult as it is often full of inconsistencies and outliers.
Model Training: Training models using large datasets may be demanding, especially for a stock prediction model that has many intricacies and factors. With large datasets, it is also vital to avoid overfitting and bias.