CS506 Project Report

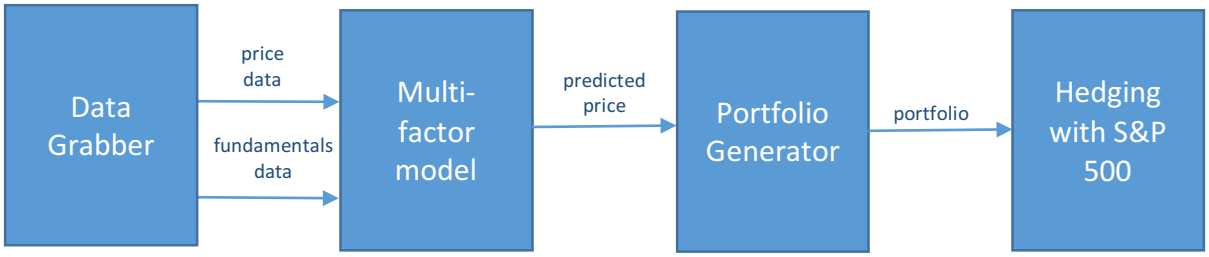
Problem: How to predict the stock pricing and generate a portfolio with hedging in a medium time period (longer than one month and shorter than one year)?

Solution: The Quantop will apply multiple Machine Learning and statistical models (including linear regression and LSTM networks) to predict the price of stocks and generate portfolios with hedging strategies to achieve higher excess return and lower risk of volatility. The multi-factor model with share prices data and fundamentals data are utilized in generating the portfolio and hedging strategy is used to reduce the beta of the portfolio (which is a measure of systematic risk). The Quantop will also introduce RESTful APIs for automated trades.

Claims:
Claim1: The portfolio using hedge strategy can achieve higher excess returns than traditional strategies.
Claim2: The portfolio using hedge strategy can achieve lower risk of volatility than traditional strategies.
Claim3: The Quantop can offer RESTful APIs for automated trades.

Competitors:
1. J. Alberg and Z. C. Lipton's paper
2. O. B. Sezer's paper
3. S. Edet's paper
4. T. Fischer and C. Krauss's paper
5. Eurekahedge AI/ML Hedge Fund Index

Data Flow Chart



There are four main components in Quantop.

Component1: The data grabber is used to scrape both price data (which are queried from Yahoo! financial) and fundamentals data (which are queried from Morningstar API).

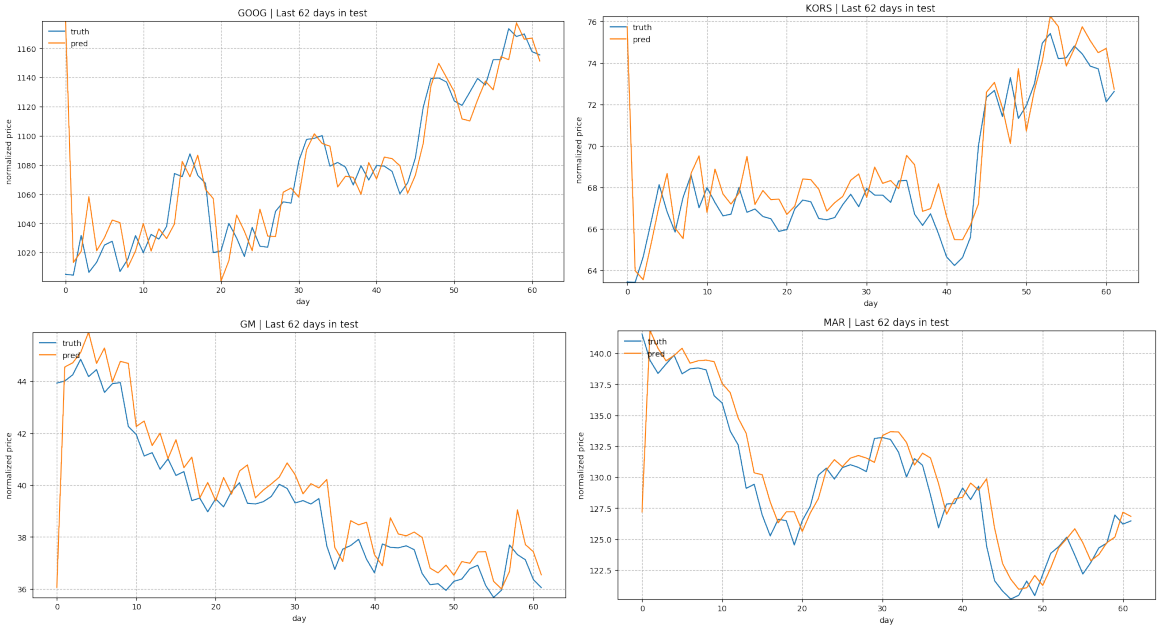
Component2: The ML and statistical models (including linear regression and LSTM networks) are introduced into the multi-factor model to predict stock prices. The multi-factors used in the forecasting model include price data (stock closing price, trading volume, etc.) and fundamentals data (revenue, gross margin, EPS, net income, etc.).

Component3: The portfolio generator can sort the stocks based on the predicated stock price and modify the stocks in the portfolio by the sorted results.

Component4: The hedging component is utilized to hedge the beta (the systemic risk) of the portfolio by shorting S&P 500 index.

Results:
The prototypes of the four main components in Quantop has been implemented.

Predicted price results of some stocks (component2):



Finally, simulations demonstrate that the portfolio generated by Quantop yields an annualized return on investment (ROI) of 29.91% and a Sharpe Ratio of 0.953006.

In the future, there are still some tasks to do, including optimizing the hedging ratio, optimizing the parameters in LSTM networks, offering the API to access the predicted stock price and comparing the results with competitors.