Woohyuk Choi

+82 10-7664-2001 · asaf0121@postech.ac.kr · Linkedin · Github

Education

Pohang University of Science and Technology (POSTECH) **Feb. 2021 – Feb. 2025**
Undergraduate Student in Mathematics *Pohang, South Korea*

Yonsei University **Dec. 2023 – Jan. 2024**
Credit Exchange Program *Seoul, South Korea*

Relevant Coursework

- Financial Engineering
- Investments
- Matematical DataScience
- Linear Regression
- Numerical Analysis
- Financial Economics
- Probability Theory
- Statistical Datamining

Experience

FIRM Lab, POSTECH **May 2022 – August 2022 , Feb 2023 –**
Researcher *Pohang, South Korea*

- Conducted a study for optimizing Monte Carlo simulations in the Black-Scholes world and implemented asset pricing.
- Implemented advanced machine learning models and currently not only using machine learning techniques to predict the value of cryptocurrency, but also to analyze the process of making expanded-features using macro data and raw material index data, and to consider the correlation between each feature.
- Conducted extensive research to explore the correlation between cryptocurrency prices and macroeconomic/raw material index data.

FBA Quant **Jan 2023 –**
Alumni, Acting *New York, U.S. , Remotely in Seoul, South Korea*

- A quantitative finance research group built at the intersection of Financial Engineering and Data Science.
- Studied and implemented projects with team members related with Derivative, Financial AI, High Frequency Trading, and Market Microstructure.
- Conducted research on the best way to optimize the portfolio using machine learning techniques with other members, published the paper and presented in international conference.

MSSA(Management Strategy Student Association) **Aug 2022 – Jul 2023**
Member *Pohang, South Korea*

- After studying various methods for corporate analysis, a number of them were applied to actual projects, made form sheets, and presented.
- An industry-academic project was carried out for start-up companies with eco-friendly packaging materials as their main products.
- Corporate valuation was conducted through corporate analysis and financial statement analysis.
- Improved insight into market analysis based on consulting experience and financial analysis of the company's business

Projects / Contests

Monte Carlo Simulation in Black-Scholes World | *Asset Pricing , Portfolio Management* **May 2022 – August 2022**

- Research for getting the method of optimization of Monte-Carlo Simulation and Portfolio optimization

WorldQuant International Quant Championship(IQC) | *Trading Strategy* **May 2023 – Jun 2023**

- Made a lot of optimized alpha to make its return and Sharpe ratio larger with proper turnover
- Recorded 17th place in South Korea

Samsung Insurance Data-Based Risk Management Competition | *Data Analysis, Insurance* **Sep 2023 – Oct 2023**

- Calculated risk rates and premiums for delivery motorcycles based on accident data and traffic data and segmentation by region.
- Methodology for differentiating insurance premiums through reasonable hierarchical clustering after individual risk rates are set according to the route and region in which the delivery person moves

Portfolio Generation with ML Techniques | *ML, Portfolio Management* **Jun 2023 – Dec 2023**

- This research delves into developing and evaluating a novel algorithm tailored for generating optimized portfolios comprising 200 long and 200 short positions from a universe of 2,000 items, based predominantly on Machine Learning (ML) techniques.

- Recognizing the heterogeneity and complexity of financial markets, our approach uniquely integrates three distinct views and investment strategies. Instead of relying on a singular predictive model, we harness the consensus power of hard voting, a method traditionally used in ensemble learning.
- Through this fusion, our algorithm enhances prediction accuracy and ensures diversification and robustness, key hallmarks of a resilient portfolio. Extensive back-testing and validation on historical data demonstrate promising outperformance compared to traditional portfolio construction methods.
- Two related publications are below.

Predicting Cryptocurrency Trends Through News Data Crawling | *ML, Data Crawling* **Feb 2023 – Jun 2023**

- Contribute to prediction by sentimental analysis through crawling of news data and adding it as a feature.
- As a single stock, Tesla's stock price was predicted by crawling news mainly related to Elon Musk, and as index, it predicted the S&P 500 and KOSPI and applied ARIMA and CNN-LSTM techniques to make predictions.

Detection of Rigged election in South Korea | *Mathematical Data Science* **Oct 2023 – Dec 2023**

- Applied Benford's law to detect whether any of Korea's previous elections are suspected of fraudulent elections.
- The validity of the analysis is presented by conducting the Likelihood Test using the Chi-Square Test.
- As a result of the research, the suspicion of fraudulent elections was relatively high in areas with strong political trends, and low suspicion in modern times with increasing democratic consciousness.

Strategy of Crypto Trading with ML Approach with Macro/Raw Material Data | *ML, Strategy* **Jun 2023 –**

- In short, progressing by utilizing CNN, LSTM, CNN-LSTM, Sliding-window CNN-LSTM model.
- Currently, expanding horizons to various cryptocurrencies. These days, applying some global market macro data and raw material index data for features we utilize so we are in experiment about checking the correlation between return of close price of cryptocurrency and macro/raw material index data.
- Each of the upward and downward prediction models was elaborately manufactured and ensemble models were created. As a result, a model that can stably yield more than three times the return of benchmark was developed.

Publication

- Insu Choi*(KAIST); Jaepil Choi*(Woori Bank); Woohyuk Choi*(POSTECH); Woochang Kim(KAIST) , Hard Voting-Based Long-Short Portfolio Generation with Machine Learning Techniques and Technical Indicators (2023) , ISIS2023 (The 24th International Symposium on Advanced Intelligent Systems)
- Insu Choi*(KAIST); Jaepil Choi*(Woori Bank); Woohyuk Choi*(POSTECH); Woochang Kim(KAIST) (2023). An ensemble investment strategy based on Prophet and XGBoost regression estimation. A collection of papers from the Fall Conference of the Korean Society for Industrial Management and Systems, 2023.

Certification

- ***Advanced Data Analytics Semi-Professional (ADsP)***
- ***Google Analytics Certification***

Language

- **Korean** - Native
- **English** - Expert (TSW AM/AL , OPIc AL/IH , TOEIC 825)
- **Chinese** - A little bit

Leadership / Extracurricular

Student Council of Department of Mathematics **Dec 2022 – Dec 2023**
Vice-President *POSTECH*

Student Education Committee **Mar 2022 – Jan 2024**
Team Leader *POSTECH*