Jian Liu

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SUMMARY

PhD candidate in Operations Research at CUHK with a research focus on optimal decision-making under uncertainty. Strong foundation in game theory and stochastic optimization. Familiar with Python and financial data platforms and APIs. Primary experience in quantitative strategy development and backtesting short-term trading strategies. Passionate about translating theory research into actionable solutions in quantitative finance.

EDUCATION

The Chinese University of Hong Kong Hong Kong
Ph.D. in Systems Engineering & Engineering Management 2020-2025
Major: Operations Research. Supervisor: Prof. Huifu Xu

Dalian University of Technology Dalian, China
M.S. in School of Mathematical Sciences 2017-2020
Major: Operations Research. Supervisor: Prof. Jia Wu

Heilongjiang University of Science and Technology Harbin, China
B.S. in School of Mathematical Sciences 2013-2017
Major: Mathematics and Applied Mathematics. Supervisor: Prof. Jing Xu

RESEARCH

[1] **J. Liu**, H. Sun, and H. Xu, Bayesian Nash Equilibrium in Price Competition under Multinomial Logit Demand. ***European Journal of Operational Research***, 2025.

[2] **J. Liu**, Z. Su, and H. Xu, Bayesian Distributionally Robust Nash Equilibrium and Its Application. ***Pacific Journal of Optimization***, 2025.

[3] **J. Liu**, H. Xu, Robust Mean-Square-Variance Profit Nash-Bertrand Equilibrium in Price Competition under Multinomial Logit Demand. Submitted to ***Journal of Mathematical Economics***, 2024.

[4] **J. Liu**, H. Xu, Generalized Bayesian Nash Equilibrium in Supermodular Games. **Working paper**.

SKILLS

Mathematical Modeling: Bayesian Nash equilibrium, Distributionally robust optimization, Game theory, Discrete choice models, Convex optimization.

Quantitative Research: Alpha signal design. Factor modeling, Market timing, Strategy backtesting, Risk metrics.

Programming & Tools: Python (Pandas, NumPy, Backtrader, Matplotlib), Matlab, LaTeX, Minitab, GAMS, Excel.

Financial Data Platforms: AKShare, Yfinance, Tushare, Choice.

Language: Mandarin (Native), English (Fluent).

PROJECTS

Developed and back-tested short-term trading strategies using historical data from over 3,000 A-share stocks between 2019 and 2025. The goal was to explore whether specific market signals, such as daily limit-up events and trading volume, could help predict short-term price movements. The process included three main parts:

- **Data Collection and Processing.** Collected stock data from Choice and AKShare, then cleaned and organized it using Python tools like Pandas and NumPy to prepare for modeling.
- **Strategy Development.** Formulated the problem as a supervised learning task by using financial indicators as features and returns as labels to train decision tree models. Designed and optimized a trading strategy by incorporating positively correlated signals.
- **Strategy Evaluation and Optimization.** Evaluated the strategy using key metrics such as annualized return, Sharpe ratio, and maximum drawdown. Analyzed losing trades and adjusted position sizes and timing rules to optimize strategy.

Based on this framework, I designed two specific strategies that performed consistently well during backtesting:

[1] **Limit-up Pattern Strategy (China A-share Market)** 2019.01-2025.04

- Short-term trading strategy using limit-up patterns, turnover rates, timing, and opening increase.
- Achieved 133.06% annualized return, 3.71 Sharpe ratio, and -33.60% max drawdown.

[2] **Volume-based Strategy (China A-share Market)** 2019.01-2025.04

- Short-term trading strategy using volume, turnover rates, timing, and opening increase.
- Achieved 55.34% annualized return, 2.78 Sharpe ratio, and -31.71% max drawdown.

AWARDS

CUHK Postgraduate Studentships 2020-2024
The CUHK Reaching Out Award (ROA) 2023
Huawei Cup China Post-Graduate Mathematical Contest in Modeling, **Third Prize** 2018
Huawei Cup China Post-Graduate Mathematical Contest in Modeling, **First Prize** 2017
The Chinese Mathematics Competitions (CMC), **First Prize** 2016
China Undergraduate Mathematical Contest in Modeling (CUMCM), **First Prize** 2016
The Chinese Mathematics Competitions (CMC), **First Prize** 2015
China Undergraduate Mathematical Contest in Modeling (CUMCM), **First Prize** 2015

TEACHING

Teaching Assistant, The Chinese University of Hong Kong 2020-2025
Engineering Economics, Numerical Optimization, Quality Control, Probability for Engineers

Teaching Assistant, Dalian University of Technology 2018-2020
Advanced Mathematics