

Weizhi Liu

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Education

NUS :: Department of Industrial Systems Engineering and Management

Singapore

MULTI-OBJECTIVE SIMULATION OPTIMIZATION, PH.D.

2014.08-2018.11

Nanjing University :: Department of Management Science and Engineering

Nanjing, China

FINANCIAL ENGINEERING, B.ECON; INDUSTRIAL ENGINEERING, B.ENG.

2010.09-2014.06

Experience

National University of Singapore

Singapore

RESEARCH FELLOW, CENTRE OF EXCELLENCE IN MODELLING AND SIMULATION FOR NEXT GENERATION PORTS

2018.10-Present

- Collaborated with local and oversea researchers to accomplish the tier 2 project of Ministry of Education of Singapore, "Design for High-Performance Framework of Multi-fidelity Simulation Optimization", which led to one top tier journal paper in control engineering with impact factor 5.007, one working paper, and two conference papers presented in Winter Simulation Conference.
- Led the research team to develop simulation budget allocation strategies for binary classification with noisy labels to save simulation budget significantly and guarantee the probability of false classification decays to zero at the exponential rate.
- Participated in NOL Fellowship programme to develop an automatic stowage planning software with a guarantee for ship stability and efficient operations for the fourth-largest container shipping group (CMA CGM) which are expected to save millions of dollars cost.
- Helped a research group to develop efficient vehicle routing algorithms for FedEx using approximate dynamic programming which can increase 4.4% daily throughput than the nearest-neighbor policy.

WorldQuant LLC

Singapore

RESEARCH CONSULTANT (PART-TIME QUANTITATIVE RESEARCHER)

2018.09-2019.10

- Explored on WorldQuant's WebSim platform to use advanced statistical and machine learning techniques to analyze various data sources (e.g., price/volume, fundamental data, analyst estimates, sentiments, news, and options data) to systematically designed and implemented near 400 quantitative daily-rebalance trading strategies (i.e. alphas, factors, signals) using python and in-house expression language to seek abnormal excess returns and statistical arbitrage opportunities in the US, European and Asian markets.
- Backtested these trading signals over 10-year (5-year before joining WorldQuant) history horizon and found most strategies have high Sharpe ratios (~ 2.2), stable annualized returns ($\sim 10\%$), low maximum drawdown ($\sim 2\%$) and promising out-sample performance in recent years. Some trading strategies perform quite well even in a highly liquid stock universe (e.g., Russell top 200, Asia top 150).
- One among the top strategies has one and a half year out-of-sample Sharpe ratio 5.26, 15.40% annualized return, and ten-year in-sample Sharpe ratio 3.47, 13.63% annualized return, see <https://tinyurl.com/rdof4ob> for more information.
- Ranked the 1st place in the region of China and Singapore, and top 10 in the world for the WorldQuant Spring Alphathon, 2017.

Martian Capital Management PTE. LTD.

Singapore

QUANTITATIVE RESEARCHER INTERN

2018.03-2018.09

- Developed an automatic framework in python to generate promising indicators for the prediction of the forward return of month-1 futures of WTI / Brent Crude / Heating Oil / RBOB Gasoline / Gasoil based on 10 years weekly fundamental data from the U.S. Energy Information Administration and daily price data from Thomson Reuters.
- Generated a detailed report via LaTeX to visualize indicators' profile including 1) time series, distribution, and [partial] autocorrelation graphs; 2) information coefficient decay with different forward and backward returns; 3) prediction power by regression and stratification; and 4) historical performance in a rolling window.
- Conducted statistical and feature engineering methods to select fundamental and technical indicators with prediction power.
- Established a flexible backtesting framework in python to cross-validate the out-of-sample performances of different multi-period trading strategies and the respective hyper-parameters which led to a machine-learning-based multi-factor directional strategy with three years out-of-sample Sharpe ratio 1.4.

ADVANCE.AI

Singapore

DATA SCIENTIST INTERN

2017.07-2017.10

- Designed and implemented two graph-based anti-fraud algorithms (community and anomaly detection) for GoJek in Hive SQL and pySpark to identify fraudulent drivers / customers with abnormal topological structures in the co-occurrence graph.
- Deployed the algorithms into production which can identify hundreds of scammers daily by analyzing large-scale dataset including millions of ride orders in less than one minute.
- Developed Tableau / Gephi dashboard to visualize the communities of scammers to provide evidences of their frauds.
- Conducted feature engineering and applied isolation forest, ensemble supervised learning, and natural language processing methods to predict fraudulent and abnormal scores for email addresses dataset with AUC above 70%.

Honors & Awards

- 2019.01 **Passed FRM Part 2**, Global Association of Risk Professionals
- 2018.08 **Passed CFA Level I**, CFA Institute
- 2017.04 **Gold Medal**, WorldQuant Global Alpha Building Competition
- 2017.03 **Level 5 (Finalist)**, Google FooBar Coding Challenge
- 2014.05 **Graduate of Excellence**, Nanjing University
- 2013.02 **INFORMS Paper Award (0.04%, 2/5536)**, The Mathematical Contest in Modeling
- 2013.02 **Outstanding Winner (0.2%, 11/5536)**, The Mathematical Contest in Modeling

Skills

- **Programming:** Python, Cpp, Matlab, R, SQL, Git, Linux, Shell Scripting, \LaTeX
- **Finance Modules:** Accounting, Equity Investment, Financial Econometrics, Financial Engineering, Financial Microstructure, Financial Risk Management, Fixed Income Securities, Macroeconomics, Microeconomics, Structured Finance
- **Mathematic Modules:** Calculus, Convex Optimization, Linear Algebra, Machine Learning, Numerical Methods, Operations Research, Probability and Statistics, Randomized Algorithms, Surrogate Optimization
- **Languages:** Mandarin Chinese (native), English (fluent), Japanese (beginner)

Publications

- [1] Weizhi Liu*, Siyang Gao, and Loo Hay Lee. A partition-based random search for multi-objective optimization via simulation. Under Review, 2019.
- [2] Louis Douge, Chenhao Zhou*, Weizhi Liu, Yanchunni Guo, Loo Hay Lee, and Ek Peng Chew. Online vehicle routing under stochastic demands using reinforcement learning. Under Review, 2019.
- [3] Weizhi Liu*, Haobin Li, Hui Xiao, Loo Hay Lee, and Ek Peng Chew. Optimal computing budget allocation for binary classification with noisy labels and its applications on simulation analytics. In *Proceedings of the 2019 Winter Simulation Conference*. IEEE, 2019.
- [4] Juxin Li, Weizhi Liu*, Giulia Pedrielli, Loo Hay Lee, and Ek Peng Chew. Optimal computing budget allocation to select the non-dominated systems - a large deviations perspective. *IEEE Transactions on Automatic Control*, 2018.
- [5] Chenhao Zhou*, Haobin Li, Weizhi Liu, Stephen Aloisius, Loo Hay Lee, and Ek Peng Chew. Challenges and opportunities in integration of simulation and optimization in maritime logistics. In *Proceedings of the 2018 Winter Simulation Conference*, pages 2897–2908. IEEE, 2018.
- [6] Weizhi Liu*, Siyang Gao, and Loo Hay Lee. A multi-objective perspective on robust ranking and selection. In *Proceedings of the 2017 Winter Simulation Conference*, pages 2116–2127. IEEE, 2017.
- [7] Weizhi Liu, Juan Li*, Di Zhang, and Wei Chen. Fairness’s effect on the pricing decisions of the supply chain. *Journal of Management Sciences in China*, 20(7):115–126, 2017.
- [8] Cenying Yang, Wei Chen, and Weizhi Liu*. Make wise use of every drop. *Mathematical Modeling and Its Applications*, 2(5–6):75–89, 2013.
- [9] Cheng Ji*, Weizhi Liu, and Huiwen Chen. Verification of option parity relations in domestic warrants market of china. In *Proceedings of 2013 3rd International Conference on Social Sciences and Society(ICSSS 2013)*, 2013.
- [10] Cheng Ji*, Mengyi Niu, Weizhi Liu, and Jinyang Han. Joint distribution center model in university community. *China Journal of Commerce*, 11:091, 2013.