

# Oliver (Haoqian) Li

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## SUMMARY

My primary interests encompass a wide range, including deep reinforcement learning (DRL), LLM fine tuning, statistical modeling, quality control, and machine learning in general. I'm passionate about applying my machine learning knowledge into solving complex real-world problems, such as LLM applications, IoT, process monitoring, anomaly detection, financial markets, crowdsourcing, etc.

## EDUCATION

**University of Wisconsin-Madison** | Madison, WI

Expected Ph.D. in Dec 2024

Ph.D. in **Industrial & Systems Engineering**

GPA: 3.8/4.0

M.S. in **Computer Science**

Received in May 2023 GPA: 3.9/4.0

Advisor: Prof. Kaibo Liu

- Relevant Courses: Advanced Deep Learning, Dynamic Programming, Machine Learning, Nonlinear Optimization, Integer Optimization, Simulation, Survival Analysis, Quality & Reliability Control

**Columbia University** | New York, NY

Feb 2020

M.S. in **Operations Research**

GPA: 3.82/4.00 (Master level 4.00/4.00)

- Relevant Courses: Machine Learning for FE/OR, Deep Learning, Optimization Models & Methods, Computational Discrete Optimization, Probability and Statistics, Stochastic Modeling, Simulation

**Haverford College** | Haverford, PA

May 2018

B.S. in **Mathematics**; Minor in **Economics**

GPA: 3.86/4.00

Thesis: Convex Optimization and the Interior Point Algorithm

- Relevant Courses: Advanced Calculus, Linear Algebra, Analysis, Algebra, Differential Equation, Linear Optimization, Statistical Methods in Economics

## TECHNICAL SKILLS

**Programming languages**: Python, Gurobi, Matlab, GAMS, Java, PostgreSQL

**Software**: LaTeX, Microsoft Office

## RESEARCH & INTERN EXPERIENCE

**Suiling Tech** | Madison, WI

*Tech Cofounder*

May 2024 – Present

- Utilized GPT-4 to build character robots in the game AI field, systematizing the creation of lore, backgrounds, scenes, and other NPC-related information.
- Completed the construction of Prompt Structure and Classifying Assistant to build scalable game NPC characters that interact with users and learn from them.

**LLM Start-up** | Madison, WI

*Self-employed*

October 2023 – April 2024

- Utilized QLoRA BitFit, and P-tuning techniques to fine-tune the GPT/Llama model specifically for classifying and constructing optimization models with classification accuracy over 96%.
- Developed an RLHF framework, including supervised fine tuning, reward model building, and PPO, that provides verbal explanations of optimization solutions to users.
- Pretrained a large coding model, including scraping code from GitHub, cleaning code data, and customizing tokenization training data.

**UW-Madison SIDA Lab, Industrial & Systems Engineering** | Madison, WI

*Graduate Student Research Assistant*

Dec 2020 – Present

- Conducting research on the application of Deep Reinforcement Learning (DRL) in high-dimensional monitoring, anomaly detection, crowd sourcing, financial markets as well as the general algorithm design and analysis of DRL.
- Conducted research on the variation of the transformer and its application in the financial markets by considering the translation of one stock to another as well as the prediction of future stock prices.
- Conducted research on End-of-Line Vehicle Component Tests Anomaly detection on the 2022 QSR Ford Data Competition. Achieved over 90% accuracy in identifying the root causes of an anomaly occurrence.
- Completed research on applying Reinforcement Learning techniques in statistical process monitoring under partially observable setting with resource limitation constraints for non-parametric distributed data streams.

**Amazon** | Seattle, WA  
*Applied Scientist Intern*

June 2023 – September 2023

- Conducted research on the application of graph neural networks (GNN) within Amazon's supply chain and logistics network, focusing on estimating fulfillment costs.
- Developed a pioneering explanation mechanism, "DeX," for the GNN model, enabling identification of the smallest subgraph responsible for fulfillment cost estimates; reduced the problem's scale to 0.2% of its original size, with a minimal 6% increase in the error rate.
- Deployed state of the art GNN explainability model GNNExplainer and PGExplainer. Employed advanced machine learning techniques, including boosted tree and lasso regression, to optimize and enhance feature engineering for the GNN model.
- Created visual representations of subgraph edges and transportation flow paths using custom visualization techniques.
- Leveraged the "DeX" explainer to detect and analyze defects in the developed GNN model, introduced novel performance metrics.
- Participated in weekly meeting with stakeholders and improved the model based on the collected feedback and requirements.

**Point Zero One Technology Ltd** | Hong Kong (Remote)

*Research Intern*

Aug 2019 – September 2019

- Independently studied and conducted research on the application of reinforcement learning in quantitative trading in the cryptocurrency market. Applied the Actor-Critic algorithm considering value-function approximation.
- Achieved over 60% of revenue growth. Published a twelve-page survey in Point Zero One's archive and Cornell arxiv.org.

**Columbia University** | New York, NY

*Research Assistant*

May 2019 – Aug 2019

- Developed a node-based online influence maximization problem in social networks under the independent cascade model with Dr. Van-anh Truong.
- Proved the necessity of sub-modularity and proposed to use reinforcement learning with sampling to bound the error.
- Created a program to test the performance of both edge semi-bandit feedback model and node-based model using Python, accuracy over 90% in simulated networks.

**Founder Securities Co., Ltd** | Beijing, China

*Analyst Intern*

June 2018 – Aug 2018

- Developed a program static and dynamic Nelson-Siegel Models to forecast the yield curve changes for diverse bonds with different maturity and found the optimal parameters that minimize error in Chinese financial markets vs. US financial markets.
- Performed fixed-income performance attribution analysis to evaluate the performance of fund managers.
- Developed a program to utilize the trained models to forecast future bond market fluctuation and completed simulated trading scenarios with 10% return rate.

## **PUBLICATIONS & REPORTS**

- *Efficient and Economical Adaptive Sampling in High Dimensional Monitoring with A2C*. Haoqian Li, Kaibo Liu (2024 T-ASE under review)
- *Online Monitoring of High-dimensional Partially Observable Data Streams with Statistical Double Dueling Deep Q-network*. Haoqian Li, Ziqian Zheng, Kaibo Liu (2024 T-ASE under review)
- *Online Monitoring of Heterogeneous Partially Observable Data Streams based on Q-learning*. Haoqian Li, Honghan Ye, Kaibo Liu (2024 T-ASE accepted).
- *A Deep Learning Framework for Adaptive Sampling in Monitoring High-Dimensional Processes*. Ziqian Zheng, Haoqian Li, Kaibo Liu. (2024 Technometrics under review)
- *Reinforcement Learning: Prediction, Control and Value Function Approximation*. Haoqian Li & Thomas Lau. (2019). <https://arxiv.org/abs/1908.10771>
- *A Survey of Adwords Problem with Small Bids In a Primal-dual Setting: Greedy Algorithm, Ranking Algorithm and Primal-dual Training-based Algorithm*. Haoqian Li. (2019). <https://arxiv.org/abs/1910.14610>
- *A Survey of Index Fund Construction with Discrete Optimization Techniques: MST, HCT and Neighbor-Net Splits*. Haoqian Li, Runhan Bi, Meixiao Han. (2019).
- *Thesis: Convex Optimization, Newton's Method and Interior Point Method*. Haoqian Li. (2018). Haverford College thesis archive.

## **HONORS & REWARDS**

- *Phi Beta Kappa Society* (2018)
- *Graduation Cum Laude* (Haverford College 2018)
- *IISE Best Student Paper awards Finalists* (2023): *Online Monitoring of Heterogeneous Partially Observable Data Streams based on Q-learning*
- *Graduate Student Travel Grant Award* (2023)

## **LEADERSHIPS**

**Haverford College** | Haverford, PA

*President & Founder*

Jan 2017 – May 2018

- Planned and led meetings twice a month to discuss logistics and plans of the Tea Club.
- Built successful connections with the Shofuso House in Philadelphia to hold tea ceremonies at Haverford once a year.

## **INTERESTS**

Tennis; Piano; Code challenge; Research; Journal reading; Cooking; Traveling