Bingrui Bian

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Purdue University, West Lafayette, IN, USA

Education

- **Purdue University** *2023-2027 Expected*
  Ph.D. Candidate in Supply Chain & Operations Management. Supervisor: Prof. William B. Haskell USA
- **Shanghai Jiao Tong University** *2019-2023*
  B.S. in Business Data Science Shanghai, China

Research

Dynamic Control

Dynamic Inventory Control of Nonprofit Organization with Financial Risk Constraints
Working paper. Supervised by: Prof.William B. Haskell, Qi Feng, J.George Shanthikumar 2025 - Present

- Develop a stochastic dynamic inventory control model for nonprofit organizations with uncertain demand and donations
- Incorporate convex risk measure constraints (e.g., CVaR) to capture tail risk and ensure financial robustness
- Identify the optimal risk-aware policy that maximizes total service level under financial risk constraints

Arbitrage-Aware Sequencer Control for L2 DEXs: Queuing and Optimal Batching
Working paper. Supervised by: Prof. J.George Shanthikumar 2025 - Present

- Model L2 DEX order flow and blob-fee dynamics; define an arbitrage-window objective trading off delay, slippage, and L1 posting cost.
- Build a MDP control for sequencer batch posting under time-varying blob base fees.
- Identify an MEV-aware optimal posting policy that balances arbitrage capture, latency, and blob fees

Distributionally Robust Optimization

Preference Robust Ambiguity-Averse Optimization
To be submitted. Prepint: [SSRN] Supervised by: Prof.William B. Haskell 2024 - 2025

- Developed an axiomatic framework for distributionally preference robust optimization (DPRO) capturing ambiguity in both beliefs and tastes
- Formulated and analyzed optimization models under joint belief and preference ambiguity
- Proposed a tractable conic reformulation enabling efficient computation of the DPRO problem and its application to social welfare analysis

A Distributionally Preference Robust Optimization Fine-tuning Method for LLM
Working paper. 2025 - Present

- A new modeling methods for LLM Fine-tuning to avoid model collapse.
- A conic optimization reformulation for objective in FT stage.
- A dual projection policy gradient method.

Projects

Arbitrage Systems

Polymarket Prediction-Market Arbitrage Systems 2025

- Designed and implemented automated arbitrage strategies on Polymarket, exploiting mispricing between YES/NO contracts and range markets while accounting for fees and liquidity
- Built a payoff-modeling framework to construct bundles with non-negative payoff across all outcomes and tested them on historical Polymarket order book data

Work Experience

- **Purdue University** *Aug. 2023 – Present*
  Research Assistant
- **Purdue University** *Aug. 2023 – Present*
  Teaching Assistant

Honors and Awards

- **Presidential Doctoral Excellence Award** *2024,2025*
- **Krannert School of Management Award for Doctoral Study in Supply Chain & Operations Management** *2023*
- **Outstanding Graduates of Shanghai Jiao Tong University, Top 5%** *2023*
- **Shanghai Jiao Tong university scholarship** *2019-2022*
- **Outstanding group of SJTU Mathematics Modeling Competition, 1st** *2022*

Skills

- **Languages:** English, Chinese
- **Programming Languages:** Python, C++, SQL
- **Learning Skills:** Machine Learning, Reinforcement Learning