Hongyu Chen

School of Mathematical Sciences, Peking University

Tel: (+86) 19801203641, E-mail: hongyuchen@pku.edu.cn, Personal Website: hongyuchen.site

EDUCATION

PEKING UNIVERSITY Sep. 2018 - Jul. 2022 (expected)

B.S. in Statistics, and B.S. in Economics (double major).

- **Academics:** Overall GPA: 3.86/4.00, Ranking 2/59.
- **Selected Coursework:** Mathematical Analysis I (95), Linear Algebra II (96), Real Analysis (97), Abstract Algebra (99), Probability Theory (100), Mathematical Statistics (95), Applied Stochastic Process (96), Data Structure and Algorithms (97.5), Measure Theory (95), Econometrics (92), Intermediate Macroeconomics (100), Intermediate Microeconomics (91).
- **Graduate Courses:** Convex Optimization (92), Asymptotic Statistics (96), Bayesian Theory and Algorithms (93.3), Statistical Learning (88), Stochastic Analysis and its Application (99).
- **Honors and Awards:** Gold Medal in the 33th China Mathematics Olympiad Final (2017), Merit Student of Peking University (2019, 2020, 2021).

PUBLICATIONS & MANUSCRIPTS

- "Assortment Display, Price Competition and Fairness in Online Marketplaces", with David Simchi-Levi, Hanwei Li, Michelle X. Wu and Weiming Zhu, under review at ***Management Science***. Link: https://ssrn.com/abstract=3913764.
- "Retailer Initiated Inventory-Based Financing", with Weiming Zhu, under review at ***Management Science.*** Link: https://ssrn.com/abstract=3974181.
- "Optimal Control for Parallel Queues with a Single Batch Server", with Zizhuo Wang, major revision at ***Operations Research Letters***. Link: https://hongyuchen.site/publication/carpool/carpool.pdf
- "Enhance Curvature Information by Structured Stochastic Quasi-Newton Methods", with Minghan Yang, Dong Xu, Zaiwen Wen and Mengyun Chen, accepted in ***Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2021.*** Link: https://arxiv.org/abs/2006.09606

RESEARCH EXPERIENCE

Price Competition and Assortment Display in Online Marketplaces May. 2021 – Oct. 2021

Advisor: Prof. David Simchi-Levi, Institute for Data, Systems and Society, MIT

- In this research we studied a potential partition policy for online marketplaces, in which the platform could partition the market into several sub-markets with each one receiving a fraction of demand and a fraction of sellers. We formed the problem as a two-stage game and investigated on the seller's optimal pricing decision as well as the platform's optimal partition strategy.
- Proved that when the demand is large enough, the optimal policy for the platform is to display every seller to every customer; extended the result to the settings with different inventory levels.
- Proposed a mixed-integer linear programming (MILP) formulation based on a novel tabularization algorithm to calculate the assortment policy.

- Discussed the potential fairness issue when implementing such partition strategy. Introduced two practical fairness constraints to the MIP to ensure that the algorithm achieves a relatively fair policy, and analyzed the performance of those constraints theoretically.

Retailer Initiated Inventory-Based Financing (IBF) Aug. 2021 – Dec. 2021

Advisor: Prof. Weiming Zhu, IESE Business School, University of Navarra

- In this research we studied an innovative financing scheme in which a large online retailer, such as JD.com, provides inventory-based lending to a small retailer selling through its own channel.
- Established a game theoretical setup; mathematically analyzed the optimal responses of small retailers and the online platform, including their lending behavior and the optimal interest rate.
- Numerically demonstrated the significant improvement of supply chain efficiency by employing such an inventory-based financing scheme.
- Provided empirical evidence of the stock-piling behavior of the small retailer, verified the predictions from the theoretical results through reduced-form analysis.

Optimal Control for Parallel Queues with a Single Batch Server Jan. 2021 – Oct. 2021

Advisor: Prof. Zizhuo Wang, School of Data Science, CUHK, Shenzhen

- In this research, we analyzed the optimal control policy for a system with parallel queues and a single batch server that can serve all the customers in a certain queue for a fixed amount of time.
- Formulated the problem as a Markov Decision Process (MDP) and proved the structure of the optimal control policy for the corresponding fluid model.
- Proposed a heuristic policy based on the optimal policy of the fluid model; conducted related numerical experiments to demonstrate its near-optimal performance.

Structured Quasi-Newton Method for Large-Scale Optimization Jul. 2020 – Mar.2021

Advisor: Prof. Zaiwen Wen, Beijing International Center for Mathematical Research, Peking University

- In this research, we proposed a framework to enhance curvature information of the quasi-Newton matrix in the setting of large-scale machine learning.
- Applied the proposed framework to the KFAC approximation of the Hessian matrix in deep neural networks and developed the related block-BFGS and sketching techniques. Established the theoretical guarantee for global convergence of our proposed method.
- Implemented our proposed algorithm to the optimization problem in CNN; demonstrated that our method can achieve better accuracy with similar computational cost.

ADDITIONAL INFORMATION

- **Programming Skills:** Python, Matlab, C++, Julia, R, Latex
- **Language:** Chinese (native), English (fluent)
    - **IELTS:** 8.0/9.0 (Reading 9.0, Listening 8.5, Speaking 6.5, Writing 7.0)
    - **TOEFL iBT:** 109/120 (Reading 30, Listening 28, Speaking 24, Writing 27)
    - **GRE General:** Verbal 159/170, Quantitative 170/170, Analytical Writing 4.0/6.0
- **Student Service:** Department Chair of Student Union
- **Interests:** graphic design, drawing, tennis