Zixiao Wang

(+86)13048897138 zixiaowang@link.cuhk.edu.cn github.com/xxzWzxx

Education

The Chinese University of Hong Kong, Shenzhen **Sep. 2020 – May 2024**
*BBA in Financial Engineering, with **First Class Honor*** *Shenzhen, China*

- **GPA**: 3.70/4.00; **Major GPA**: 3.82/4.00
- **Related Coursework**: Calculus, Mathematical Analysis, Optimization, Advanced Linear Algebra, Numerical Methods, Machine Learning, Algorithm($\mathbf{A}^-$/**A** range for all the courses listed)

University of California, Berkeley **Jan. 2023 – May 2023**
Visiting *Berkeley, CA, United States*

- **GPA**: 4.00/4.00
- **Related Coursework**: Discrete Mathematics ($\mathbf{A}^+$)

Research Interests

- Operation Management
- Machine Learning

Publication & Preprints

- **Zixiao Wang** and Jicong Fan. *Graph classification via reference distribution learning: Theory and practice.* In Neural Information Processing Systems (**NeurIPS**), 2024. [PDF]
- **Zixiao Wang**, Dong Qiao, Jicong Fan. *Spectral Clustering for Discrete Distributions.* (under review) [Preprint]

Work In Progress

- Zixiao Wang, Zizhuo Wang. *Omnichannel Assortment Optimization under Markovian Channel Switch.* (Ongoing)
- Zixiao Wang, Zizhuo Wang. *Dynamic Pricing Competition with Posterior Price Matching under Product Differentiation.* (Ongoing)

Research Experience

Omnichannel Assortment Optimization under Markovian Channel Switch **Aug. 2024 – Present**
Advisor: Prof. Zizhuo Wang *(Ongoing)*

- Many firms operate multiple selling channels. If customers are not satisfied with one channel, they may switch to another. We explore how can firms utilize customers' channel-switching behavior to optimize their assortment decision in each channel. Current progress include:
  - Built a model where consumers choose products in each channel according to a multinomial logit (MNL) choice model and switch between channels following a Markov Chain.
  - Analyzed the case where customers' switching behavior follows a directed acyclic graph (DAG). Showed that there exists a revenue-ordered optimal assortment in each channel. Proposed a fully polynomial time greedy algorithm to solve the assortment optimization problem.

Dynamic Pricing Competition with Posterior Price Matching **May 2024 – Present**
Advisor: Prof. Zizhuo Wang *(Ongoing)*

- Posterior price matching (PM) policies are widely adopted by retailers to mitigate consumers' waiting behavior. We explore the posterior PM policies under a duopoly competition model and analyze how these policies affect firms' revenue. Current progress includes:
  - Built a duopoly dynamic pricing competition model in which firms offering products with different quality dynamically adjust their prices in each period to maximize their discounted revenue, and heterogeneous consumers strategically choose their purchasing time to maximize utility.
  - Proved the existence and uniqueness of the subgame-perfect Nash Equilibrium of the dynamic pricing game under all price matching decisions.

* Showed that an asymmetric equilibrium in price matching decisions can emerge. The adoption of a price matching policy is determined by the relative patience levels of firms and customers. If firms are more forward-looking than the customers but not overly forward-looking, only the firm offering high quality product will choose to implement price matching, which will increase its revenue.

Graph Classification via Reference Distribution Learning (Published) **Sep. 2023 – Feb. 2024**

Advisor: Prof. Jicong Fan

- Aimed at improving current methods' performance on graph classification.
- Proposed a novel graph-level classification framework (GRDL) which does not require global pooling (readout) operation and hence effectively preserves the information of node embeddings.
- Empirical experiments on moderate-scale and large-scale graph datasets show the superiority of our GRDL over the state-of-the-art. Also, it is **at least 10x faster** than leading competitors in both training and inference stages.
- Provided a theoretical analysis of the generalization error bound of our proposed model. The bound offers valuable insights into how the generalization scales with the properties of the graph data and neural network structure.
- The bound is **tighter than other existing works**. Numerical results verify that our bound is not trivial. It is one of the first generalization bounds applicable to Graph Isomorphism Network (GIN) and our derivation can be used for other message-passing GNNs with minor modifications.

Spectral Clustering for Discrete Distribution (Under Review) **Feb. 2023 – Jun. 2023**

Advisor: Prof. Jicong Fan

- Aimed at improving current methods' performance on discrete distribution clustering.
- Proposed a simple yet effective framework based on spectral clustering and optimal transport metrics for discrete distribution clustering.
- Evluated the effect of sample complexity and provided theoretical guarantees for the consistency and correctness of clustering for the proposed methods.
- Extensive experiments on synthetic and real data show that our methods significantly increase clustering AMI and ARI comparing to baseline methods.

Honors and Awards

Dean List (CUHKSZ) 2020 – 2024

Bowen Scholarship (CUHKSZ) 2020 – 2024

Technical Skills

Programming Languages: Python (Proficient), C/C++, MATLAB, Shell, Go, MySQL, R, Git, LaTeX, STATA
Language: Mandarin (Native), English