Last updated: October, 2025

Ming Gao

minggao97.github.io • minggao@chicagobooth.edu

Research Interests

- Statistical machine learning and causal graphical models
- Structure learning and causal discovery
- High-dimensional statistics and minimax theory

Education

Ph.D. in Econometrics and Statistics 2021.09 – now

M.B.A. 2023.09 – now

Booth School of Business, University of Chicago, Chicago, IL, USA
Advisor: Bryon Aragam

M.Sc. in Statistics 2019.09 – 2021.04

Department of Statistics, University of Chicago, Chicago, IL, USA
Advisor: Jingshu Wang

B.Sc. in Statistics 2015.09 – 2019.06

School of Statistics, Renmin University of China, Beijing, China

Awards

Arnold Zellner Doctoral Prize	Chicago Booth, 2024
Stevens Doctoral Program research funding	Chicago Booth, 2023 – 2024
Ph.D Program Fellowship	Chicago Booth, 2021 – now
Outstanding Thesis Award	RUC, 2019

Research

11. **Ming Gao**, Wai Ming Tai, and Bryon Aragam. KL-BSS: Rethinking optimality for neighbourhood selection in structural equation models. *R&R under JRSSB*, 2025.

10. **Ming Gao**, Yuhao Wang, and Bryon Aragam. Optimal structure learning and conditional independence testing. *Submitted*, 2025.

9. **Ming Gao** and Bryon Aragam. Optimality and computational barriers in variable selection under dependence. *Submitted*, 2025.

8. **Ming Gao** and Cong Zhang. Optimizing return forecasts: A bayesian intermediary asset pricing approach. *Submitted*, 2024. (Presented at SFS Cavalcade North America 2025)

7. Jin-Hong Du, Tianyu Chen, **Ming Gao**, and Jingshu Wang. Joint trajectory inference for single-cell genomics using deep learning with a mixture prior. *Proceedings of the National Academy of Sciences*, 2024.

6. Yuhao Wang, **Ming Gao**, Wai Ming Tai, Bryon Aragam, and Arnab Bhattacharyya. Optimal estimation of gaussian (poly)trees. *International Conference on Artificial Intelligence and Statistics*, 2024.

5. Yuxuan Guo, **Ming Gao**, and Xiaoling Lu. Multivariate change point detection for heterogeneous series. *Neurocomputing*, 2022.

4. **Ming Gao**, Wai Ming Tai, and Bryon Aragam. Optimal estimation of gaussian dag models. *International Conference on Artificial Intelligence and Statistics*, 2022.

3. **Ming Gao** and Bryon Aragam. Efficient bayesian network structure learning via local markov boundary search. *Advances in Neural Information Processing Systems*, 2021.

2. Goutham Rajendran, Bohdan Kivva, **Ming Gao**, and Bryon Aragam. Structure learning in polynomial time: Greedy algorithms, bregman information, and exponential families. *Advances in Neural Information Processing Systems*, 2021.

1. **Ming Gao**, Yi Ding, and Bryon Aragam. A polynomial-time algorithm for learning nonparametric causal graphs. *Advances in Neural Information Processing Systems*, 2020.

Software

KL-BSS (Link):
Improving best subset selection (BSS) on neighbourhood selection/variable selection/support recovery in structural equation models and causal discovery.

PC-tree algorithm (Link):
Optimal estimation of causal poly-tree/forest models via a modified PC algorithm.

NPVAR algorithm (Link):
Learning nonparametric DAGs in polynomial time with conditional variance assumptions.

TAM algorithm (Link):
Efficient nonparametric structure learning via Testing and Masking with entropic conditions.

VITAE (Link):
Single-cell genomics trajectory inference and data integration with uncertainty quantification via variational autoencoders and hierarchical mixture priors.

Teaching Experience

Teaching Assistant

- BUSN 41901: Probability and Statistics (PhD), Autumn, 2023-2024
- BUSN 41916: Bayes, AI and Deep Learning (PhD), Autumn, 2025
- BUSN 41000: Business Statistics (MBA), Winter, 2024-2026

Professional Service

Reviewer

- **Journals**: JMLR, JCGS, CSDA, TMLR
- **Conferences**: ICML 2023-2025, NeurIPS 2022-2025, AISTATS 2022-2026, ICLR 2025-2026, CLeaR 2025, AAAI 2025, UAI 2025

Internship Experience

Data Analyst Intern, 2018.12 – 2019.05
Department of Dynamic Drilling Computing Engineering, Schlumberger, Beijing, China

Data Analyst Intern, 2018.07 – 2018.08
Department of Science and Technology, Industrial Bank of China, Shanghai, China

Quantitative Research Intern, 2018.01 – 2018.03
Lion Fund Management, Beijing, China