

Ming Gao

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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. *Major revision invited at JRSS-B*, 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:** IEEE TIT, JMLR, JCGS, CSDA, TMLR, TNNLS
- **Conferences:** ICML 2023-2026, 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

References

Bryon Aragam

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Jingshu Wang

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