Xiaochuan Shi – Curriculum Vitæ

CONTACT INFORMATION

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RESEARCH INTERESTS

Areas: causal inference, semiparametric theory, longitudinal analysis.
My research advances robust and trustworthy causal inference methods for complex observational data, with a particular focus on unmeasured confounding in longitudinal and high-dimensional settings. By leveraging structured assumptions and drawing from semiparametric theory and modern machine learning, I develop approaches that yield identifiable, interpretable, and actionable causal estimates.

EDUCATION

University of Toronto
Department of Statistical Sciences 2021/09 – Present
Ph.D., Supervisors: Linbo Wang and Dehan Kong

University of Washington
Department of Statistics 2019/09 – 2021/06
MSc, Supervisor: Amy Willis
Courses: Statistical Inference & Learning, Advanced Regression Methods

University of California, Berkeley
Department of Statistics 2018/01 – 2018/05
Exchange Student
Courses: Time Series, Linear Model, Principles & Techniques of Data Science

Nanjing University
School of Mathematics 2015/09 – 2019/06
BASc, Supervisor: Hui Qu
Thesis: Panel-based Autoregressive Model for Forecasting Realized Volatility
Outstanding Graduate in Jiangsu, NJU Outstanding Scholarship (top 5%)

IN PREPARATION & UNDER REVIEW

[A1] **Xiaochuan Shi**, Dehan Kong, Linbo Wang. Dynamic Causal Effect Identification: A Sparse and Low-Rank Decomposition Approach, 2026.

[A2] Ruixuan Zhao, **Xiaochuan Shi**, Linbo Wang. Towards the Revival of Survival Ratio, 2025.

[A3] **Xiaochuan Shi**, Amy Willis. Removing sample-to-sample cross-contamination in high throughput sequencing data. Minor Revision in *Journal of Applied Statistics*, 2024.

PUBLICATIONS

[J1] **Xiaochuan Shi**, Dehan Kong, Linbo Wang, Simultaneous Estimation of Multiple Treatment Effects from Observational Studies. *Journal of Computational and Graphical Statistics*, 2024. https://doi.org/10.1080/10618600.2024.2449074

[J2] Yanting Huang, Xiaobo Sun, Huige Jiang, Shaojun Yu, Chloe Robins, Matthew J Armstrong, Ronghua Li, Zhen Mei, **Xiaochuan Shi**, Ekaterina Sergeevna Gerasimov, Philip L De Jager, David A Bennett, Aliza P Wingo, Peng Jin, Thomas S Wingo, Zhaohui S Qin. A machine learning approach to brain epigenetic analysis reveals kinases associated with Alzheimer's disease. *Nature Communications*, 12.1: 4472, 2021. https://doi.org/10.1038/s41467-021-24710-8

PROJECTS

Time-Decaying Treatment Effects Estimation with an Autoregressive Outcome Model
Advisor: Professors Linbo Wang and Dehan Kong, University of Toronto 2024/09 – present

- Established identification of time-varying causal effects under possible unmeasured confounding by imposing a low-rank (latent factors) + sparse (conditional graph) structure on longitudinal outcomes; reduced the problem to precision-matrix decomposition.
- Developed an EIF-based, cross-fitted estimator compatible with modern ML learners that attains semiparametric efficiency with valid uncertainty quantification.
- Applied to ICU EHR (12-hour blood pressure): end-to-end cleaning/EDA/modeling and sensitivity checks; found the drug's stabilizing effect persists longer than naive analyses suggested.

Simultaneous Estimation of Multiple Treatment Effects from Observational Studies
Advisor: Professors Linbo Wang and Dehan Kong, University of Toronto 2022/09 – 2024/01

- Formulated causal feature selection under unmeasured confounding via a latent-factor model; solved exact L_0 effect selection with mixed-integer programming to recover a small, interpretable set of non-zero treatments.
- Ran sensitivity analyses (factor rank, assumption violations) and validated on genome-wide data, identifying body-weight loci.

PROFESSIONAL EXPERIENCE

Morgan Stanley, Montreal, ON
Quantitative Researcher at *Derivatives team* 2026/05 – 2026/08

Emory University, Atlanta, GA
Research Intern at *Biostatistics and Bioinformatics Lab* 2023/05 – 2023/07
Advisor: *Steve Qin*
Research Area: Machine Learning for Genetics

TEACHING

Guest Lecturer, University of Toronto
- STA437: Methods for Multivariate Data 2024 Winter

Teaching Assistant, University of Toronto
- STA314: Statistical Methods for Machine Learning 2025 Winter
- STA257: Probability and Statistics 2025 Fall
- STA347: Probability 2024 Winter
- STA314: Statistical Methods for Machine Learning 2024 Fall
- STA347: Probability 2023 Winter
- STA257: Probability and Statistics 2023 Fall
- STA347: Probability 2022 Winter
- STA314: Statistical Methods for Machine Learning 2022 Fall
- STA303: Methods of Data Analysis 2021 Winter
- STA257: Probability and Statistics 2021 Fall

Drop-in Tutor at Statistics Study Center, University of Washington 2020

AWARDS & HONORS

- Connaught International Scholarship 2021 – 2025
- ASA Student and Early Career Travel Fund 2025
- Nanjing University Outstanding Scholarship (top 5%) 2018
- Hainan Airlines Scholarship 2017

SERVICE

Reviewer:
- Conference on Uncertainty in Artificial Intelligence (UAI)