ROBIN LIU

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EDUCATION

University of California, Santa Barbara   *2020 - Present*
Ph.D. Statistics (*expected 2026*); M.A. Statistics (*awarded 2022*)
Advisor: Dr. Guo Yu

University of Michigan, Ann Arbor   *2009 - 2013*
B.S. Honors Mathematics; B.S. Computer Science

RESEARCH EXPERIENCE

My current research is on the statistical properties of networks in biological systems. *Gaussian graphical models* (GGMs) are statistical models that reveal the conditional independence structure of vector-valued responses. My work extends GGMs by incorporating external covariate information. This novel method can be used in expression quantitative trait loci (eQTL) analysis, where the goal is to identify genetic variants that regulate gene expression.

I am also developing a novel method to estimate the functional connectivty of the brain. In typical fMRI applications, the blood oxygen level is measured at the voxel-level and the signals are then averaged over the voxels for each region. We develop a mixed-effects model that directly accounts for the voxel-level fluctuations without loss of information from averaging. We apply this work to large-scale fMRI data from the Human Connectome Project.

As a graduate student mentor, I supervised a senior data science capstone project in collaboration with SLAC National Accelerator Laboratory. I helped students develop and train a convolutional neural network used to predict the resolution of images from X-ray crystallography experiments. This pipeline is currently being used at the synchotron light source at SLAC.

PUBLICATIONS

Liu, R., & Yu, G. (In preparation) *Natural Covariate-adjusted Gaussian Graphical Regression.*

Zhang, C., **Liu, R.**, Achard, S., Meiring, W., Petersen, A. (In preparation) *A Mixed Model Approach for Estimating Regional Functional Connectivity from Voxel-level BOLD Signals.*

Mendez, D., Holton, J.M., Lyubimov, A.Y., Hollatz, S., Mathews, I.I., Cichosz, A., Martirosyan, V., Zeng, T., Stofer, R., **Liu, R.** and Song, J. (2024). *Deep residual networks for crystallography trained on synthetic data. Acta Crystallographica Section D: Structural Biology, 80(1).*

AWARDS

2024 WNAR Student Most Outstanding Paper Award (https://wnar.org/news/13381008)

PRESENTATIONS

Natural Covariate-adjusted Gaussian Graphical Regression

· WNAR IBS/Graybill Conference 2024, Fort Collins, CO
· Joint Statistical Meetings 2024, Portland, OR

SERVICE

Reviewer for *Scientific Reports*

TEACHING

Teaching Associate (Instructor of Record)

· PSTAT 10: Principles of Data Science (Summer 2022)

Teaching Assistant

· PSTAT 232: Computational Techniques in Statistics
· PSTAT 134: Statistical Data Science
· PSTAT 135: Big Data Analytics
· PSTAT 120B: Probability and Statistics II

INDUSTRY EXPERIENCE

Quantitative Risk Management Inc. 2013 - 2020
.NET Developer *Chicago, IL*

· Developed balance sheet management software for a leading financial risk management consultancy
· Built a system for cleaning and aggregating financial transaction data using K-means clustering
· Enhanced portfolio optimization engine to support haircut modeling
· Designed and maintained database systems to handle real-world banking requirements
· Worked on a small team and communicated daily with VP and other stakeholders

Spot Trading LLC Summer 2012
Software Development Intern *Chicago, IL*

· C++ development for the trade management system of a proprietary options trading firm
· Implemented trade execution on the Boston Options Exchange
· Contributed to a risk assessment infrastructure

TECHNICAL STRENGTHS

I am highly proficient in coding. I have experience with writing scientific computing packages and deploying said packages to large-scale computing environments such a HPC clusters. A selection of tools I have used in the past include:

Languages	Python, R, C++, Julia, MATLAB, SQL
Tools	Linux, Git, Docker containers, Slurm, HPC
Packages	PyTorch, scikit-learn, SciPy, tidyverse