BRIGHAM AND WOMEN'S HOSPITAL
HARVARD MEDICAL SCHOOL

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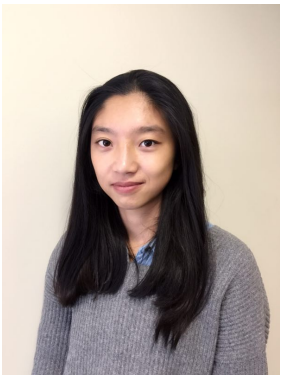
Department of Medicine
Channing Division of Network Medicine

Channing Methods Seminar

January 24 (Tuesday), 2023, 11AM (ET)

MCP 5th-floor large conference room
https://us02web.zoom.us/j/579497999?pwd=cHNlWHMzWUlFUUVJTG1EeVJmY05aQT09
Meeting ID: 579 497 999
Passcode: 844168



Yi Zhao, PhD

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Principal Regression of Covariance Matrix Outcomes

Abstract: In this study, we consider the problem of regressing covariance matrices on covariates of interest. The goal is to use covariates to explain variation in covariance matrices across units. Building upon our previous work, the Covariate Assisted Principal (CAP) regression, an optimization-based method for identifying components associated with the covariates using a generalized linear model, two approaches for high-dimensional covariance matrix outcomes will be discussed. Our studies are motivated by resting-state functional magnetic resonance imaging (fMRI) studies. In the studies, resting-state functional connectivity is an important and widely used measure of individual and group di erences. Yet, extant statistical methods are limited to linking covariates with variations in functional connectivity across subjects, especially at the voxel-wise level of the whole brain. Our work introduces modeling approaches that regress whole-brain functional connectivity on covariates and enable identification of brain subnetworks. The first approach identifies subnetowkrs that are composite of spatially independent components discovered by a dimension reduction approach (such as whole-brain group ICA) and covariate-related projections determined by the CAP regression. The second approach directly performs generalized linear regression by introducing a well-conditioned linear shrinkage estimator of the high-dimensional covariance matrix outcomes, where the shrinkage coefficients are proposed to be common across matrices. The superior performance of the proposed approaches over existing methods are illustrated through simulation studies and resting-state fMRI data applications.

***Bio**:* Dr. Yi Zhao is an Assistant Professor in the Department of Biostatistics and Health Data Science at Indiana University School of Medicine. Her study interest includes mediation analysis, decomposition methods, multiview data integration, and neuroimaging applications.

Hosted by Su Chu