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Department of Statistics

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Asymmetric canonical correlation analysis of Riemannian and high-dimensional data with an application to brain-behavior relationships.

Wednesday, September 11th, 2024
12:00 PM
110 Frelinghuysen Road, Hill Center, Room 116

Zoom Meeting: Meeting ID: 969 0606 4706
Password: 745339

https://rutgers.zoom.us/j/96906064706?pwd=ZklvbExpRVBJQ3c5dUhhYTFuR2ZrZz09
Light refreshments will be served in Hill 452, 11:20AM

Abstract: In this talk, I will introduce a novel statistical model for the integrative analysis of Riemannian-valued functional data and high-dimensional data. This model is applied to explore the dependence structure between each subject's dynamic functional connectivity --- represented by a temporally indexed collection of positive definite covariance matrices --- and high-dimensional data representing lifestyle, demographic, and psychometric measures. Specifically, a reformulation of canonical correlation analysis is employed, which enables efficient control of the complexity of the functional canonical directions using tangent space sieve approximations. Additionally, an interpretable group structure on the high-dimensional canonical directions is enforced via a sparsity-promoting penalty. Improved empirical performance over alternative approaches is demonstrated by the proposed method, which also comes with theoretical guarantees. Its application to data from the Human Connectome Project reveals a dominant mode of covariation between dynamic functional connectivity and lifestyle, demographic, and psychometric measures. This mode aligns with results from static connectivity studies but reveals a unique temporal non-stationary pattern that such studies fail to capture.

Bio: Dr Lila is an Assistant Professor in the Department of Biostatistics at the University of Washington. He completed his PhD in Statistics at the University of Cambridge. The aim of his research is to develop statistical methodologies for the analysis of imaging data, with a particular focus on integrative models for multimodal brain imaging. This involves creating statistical tools for modeling MRI and fMRI data, analyzing structural and functional connectivity networks, and linking these complex imaging phenotypes to disease, behavior, and genetics. The methods he develops combine elements of functional, non-Euclidean, and high-dimensional data analysis.