Statistics Seminar

4:00pm to 5:00pm (Central Time)

Thursday, February 3, 2022

Zoom Link: https://ksu.zoom.us/j/96942321204

Meeting ID: 969 4232 1204

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Title

Non-Euclidean Statistics for Novel Digital Biomarker Identification

Abstract

The identification, verification and application of digital biomarkers are of significant scientific interest and importance in many biomedical and healthcare disciplines. However, there still exist numerous challenges in developing more efficient and accurate statistical and data science methodologies for digital biomarker analytics. The focus of this study is thus to develop novel statistical approaches to fill the methodological gap, especially for network data derived from brain imaging. Network data contain numeric, topological, and geometrical information, and are thus necessarily considered on manifold for appropriate machine learning and statistical analysis. In this study, a novel framework is presented for two-sample comparison of networks. Specifically, an approximation distance metric to quotient Euclidean distance is proposed, and then combined with network spectral distance to quantify the local and global dissimilarity of networks simultaneously. A permutational non-Euclidean analysis of variance is adapted to the proposed distance metric for the comparison of two independent groups of networks. Comprehensive simulation studies and real applications (e.g., ADHD, ADRD) are conducted to demonstrate the superior performance of our method over other alternatives. The asymptotic properties of the proposed test are investigated, and its high-dimensional extension is discussed as well.