Indiana University Indianapolis Department of Mathematical Sciences

STATISTICS SEMINAR

12:15pm—1:15pm, Tuesday, March 11, 2025 Zoom Meeting: Meeting ID: 845 0989 4694

Speaker: Erjia Cui

Division of Biostatistics and Health Data Science, University of Minnesota

Title: Functional Fixed and Random Effects Inference with Applications to Accelerometry Data

Abstract:

We first introduce Fast Univariate Inference (FUI), a marginal approach to obtaining inferential results for functional fixed effects in functional mixed models. The approach consists of three steps: (1) fit massively univariate pointwise mixed-effects models; (2) apply any smoother along the functional domain; (3) obtain joint confidence bands using analytical or nonparametric approaches. Simulation studies show that model fitting and inference are accurate and much faster than existing approaches. To obtain uncertainty quantification for individual functions, we further extend FUI and introduce a functional random effects inference framework to obtain subject-specific inferential results, which combines local mixed models with global variance decomposition. Methods are applied to physical activity data measured by body-worn accelerometers collected from the National Health and Nutrition Examination Survey (NHANES).

Bio:

Dr. Erjia Cui is an Assistant Professor in the Division of Biostatistics and Health Data Science at the University of Minnesota. His research focuses on developing functional data analysis methods with reproducible software for analyzing large-scale, high-dimensional data, with a particular emphasis on physical activity and imaging studies. He is a co-author of the book Functional Data Analysis with R.