

Data Science Seminar
Hosted by Department of Mathematical Sciences

- Date: Tuesday, October 19, 2021
- Time: 12:00pm – 1:00pm
- Room: Zoom
- Speaker: Dr. Damla Senturk (UCLA)
- Title: Multilevel Modeling of Spatially Nested Functional Data: Spatiotemporal Patterns of Hospitalization Rates in the U.S. Dialysis Population

Abstract

End-stage renal disease patients on dialysis experience frequent hospitalizations. In addition to known temporal patterns of hospitalizations over the life span on dialysis, where poor outcomes are typically exacerbated during the first year on dialysis, variations in hospitalizations among dialysis facilities across the U.S. contribute to spatial variation. Utilizing national data from the United States Renal Data System (USRDS), we propose a novel multilevel spatiotemporal functional model to study spatiotemporal patterns of hospitalization rates among dialysis facilities. Hospitalization rates of dialysis facilities are considered as spatially nested functional data with longitudinal hospitalizations nested in dialysis facilities and dialysis facilities nested in geographic regions. A multilevel Karhunen-Loeve expansion is utilized to model the two-level (facility and region) functional data, where spatial correlations are induced among region-specific principal component scores accounting for regional variation. A new efficient algorithm based on functional principal component analysis and Markov Chain Monte Carlo is proposed for estimation and inference. We report a novel application using USRDS data to characterize spatiotemporal patterns of hospitalization rates for over 400 health service areas across the U.S. and over the post-transition time on dialysis. Finite sample performance of the proposed method is studied through simulations.

Biography of the speaker: Dr. Senturk is a Professor in the Department of Biostatistics at UCLA. Dr. Senturk's areas of statistical methodology research are longitudinal and functional data analysis. Her program of independent and creative research is motivated by her collaborative research in psychiatry and nephrology. She has been elected ASA fellow in 2020 for methodological contributions in semi-parametric modeling and functional data analysis, for innovative applications in neuroscience and other allied disciplines, for outstanding teaching and mentoring, and for exemplary service to the profession. Over the years she has served on 5 NIH R01s as PI and currently serves as the AE for Biometrics.

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