Data Science Seminar

Hosted by the Department of Mathematics and Statistics

- Date: Tuesday, March 7, 2023
- Time: 12:00pm – 1:00pm
- Room: Whitney Hall 100E
- Speaker: Dr. Sijian Wang (Rutgers, The State University of New Jersey)
- Title: Dynamic Attention-Based Functional Data Analysis.

Abstract

In recent years, deep learning models and attention mechanisms have been widely applied in the fields of natural language processing (NLP), which have surpassed the earlier approaches and achieved great success. However, there are few works about the application of deep learning models to functional data analysis (FDA) in the field of statistics. In this work, utilizing the structures of functional data, we proposed a dynamic attention mechanism, which is flexible in handling the relationship between observations for different time points and capturing the trends of data over time. Based on this dynamic attention mechanism, we developed a unified framework to handle multiple tasks in FDA, including functional regression with scalar response, functional regression with (censored and uncensored) functional response, as well as functional curve embedding. This framework can handle different types of functional data as well, including single or multiple functional covariates as well as regularly and irregularly sampled functional data. Furthermore, when the data have a hierarchically sequential structure (such as 24-hour observations in a day for multiple days), we developed a nested dynamic attention mechanism, which can further capture the information based on this hierarchical structure and improve the model performance. Our proposed methods are demonstrated on several real datasets.

Biography of the speaker: Dr. Wang has a Ph.D. in Biostatistics from The University of Michigan and a B.S. in Mathematics from Tsinghua University, China. He is currently an associate professor in the Department of Statistics, a residence member of Institute for Quantitative Biomedicine and Co-Director of Financial Statistics & Risk Management and Data Science professional master programs at Rutgers University. His research interests include proteomics, protein/drug design, statistical/machine learning and statistical modeling in biomedical and health sciences.