

## Data Science Seminar

Hosted by the Department of Mathematics and Statistics

- Date: Tuesday, November 14, 2023
- Time: 12:00pm - 1:00pm
- Room: zoom
- Speaker: Dr. Jiguo Cao (Simon Fraser University, Canada)
- Title: Machine Learning for Functional Data.

### **Abstract**

Functional data analysis (FDA) is a growing statistical field for analyzing curves, images, or any multidimensional functions, in which each random function is treated as a sample element. Functional data is found commonly in many applications such as longitudinal studies and brain imaging. In this talk, I will present a methodology for integrating functional data into deep neural networks. The model is defined for scalar responses with multiple functional and scalar covariates. A by-product of the method is a set of dynamic functional weights that can be visualized during the optimization process. This visualization leads to greater interpretability of the relationship between the covariates and the response relative to conventional neural networks. The model is shown to perform well in a number of contexts including prediction of new data and recovery of the true underlying relationship between the functional covariate and scalar response; these results were confirmed through real data applications and simulation studies.

Biography of the speaker: Dr. Cao is the Canada Research Chair in Data Science and Professor at the Department of Statistics and Actuarial Science, Simon Fraser University, Burnaby, BC, Canada. Dr. Cao's research interests include functional data analysis (FDA), sports analytics, and machine learning. His statistical methods are applied to real-world problems across various disciplines, including sports, neuroscience, public health, image analysis, genetics, pharmacology, ecology, environment, and engineering. He was awarded the prestigious CRM-SSC award in 2021 jointly from the Statistical Society of Canada (SSC) and Centre de recherches mathématiques (CRM) to recognize his research excellence and accomplishments.

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