



Department of Data Science

香港城市大學
City University of Hong Kong

Functional Nonlinear Learning

Date: 22 June 2026 (Monday)

Time: 11:00am - 12:00nn

Venue: Rm G7603, Yeung Kin Min Academic Building,
City University of Hong Kong

ABSTRACT

Functional Data Analysis (FDA) is an emerging field in statistics that focuses on the analysis of curves, images, and multidimensional functions. A key feature of FDA is the treatment of each random function as an individual sample element. This type of data is common in areas such as longitudinal studies and brain imaging. Using representations of functional data can be more convenient and beneficial in subsequent statistical models than direct observations. These representations, in a lower-dimensional space, extract and compress information from individual curves. The existing representation learning approaches in functional data analysis usually use linear mapping in parallel to those from multivariate analysis, e.g., functional principal component analysis (FPCA). However, functions, as infinite-dimensional objects, sometimes have nonlinear structures that cannot be uncovered by linear mapping. Linear methods will be more overwhelmed by multivariate functional data. In this talk, I will introduce two functional nonlinear learning (FunNoL) methods to sufficiently represent multivariate functional data in a lower-dimensional feature space. Furthermore, we merge a classification model for enriching the ability of representations in predicting curve labels. Hence, representations from FunNoL can be used for both curve reconstruction and classification. Additionally, we have endowed the proposed model with the ability to address the missing observation problem as well as to further denoise observations. The resulting representations are robust to observations that are locally disturbed by uncontrollable random noises. We apply the proposed FunNoL methods to several real data sets and show that FunNoL can achieve better classifications than FPCA, especially in the multivariate functional data setting. Simulation studies have shown that FunNoL provides satisfactory curve classification and reconstruction regardless of data sparsity.

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DS DISTINGUISHED SEMINAR



Prof. Jiguo CAO

GUEST SPEAKER'S PROFILE

Prof. Jiguo CAO is a Canada Research Chair in Data Science and a Professor in the Department of Statistics and Actuarial Science at Simon Fraser University in Burnaby, BC, Canada. His research focuses on functional data analysis and machine learning. In 2021, he received the CRM-SSC Award from the Statistical Society of Canada and the Centre de recherches mathématiques in recognition of his outstanding research contributions.

All are welcome