Waseda Seminar on Mathematical Statistics

Date: July 31 (Wed.), 2024

Venue: Meeting Room (Dept of Pure & Appl. Math), Building 63-1, Nishi-Waseda Campus, Waseda University
(Access map: https://www.waseda.jp/top/en/access/nishiwaseda-campus)

This seminar is supported by

- Waseda Program for Promotion of International Joint Research

Program

~ Some recent developments in functional data ~

14:30 ~ 15:30

Part I: *Functional data analysis, a powerful tool for modern applications*

Valentin Patilea (CREST Ensai)

Abstract: The advent of modern data collection mechanisms, exemplified by the inclusion of sensors, has given rise to a fascinating array of intricate functional data sets. In the common modeling paradigm, functional data consists of curves, surfaces, or essentially anything varying over a continuum, which for simplicity we will call curves or trajectories. In the first part of the presentation, several application examples are discussed and some formal definitions necessary for functional data modeling are introduced. Some of the main statistical procedures for functional data are reviewed in the ideal case of fully observed curves.

15:30 ~ 15:45 Coffee Break

15:45 ~ 16:45

Part II: *Some challenges in functional data analysis*

Valentin Patilea (CREST Ensai)

Abstract: Functional Data Analysis (FDA) depends critically on the regularity of the observed curves or surfaces. Estimating this regularity is a difficult problem in nonparametric statistics. In FDA, however, it is much easier due to the replication nature of the data. After introducing the concept of local regularity for functional data, we provide user-friendly nonparametric methods for investigating it, for which we derive non-asymptotic concentration results. The results are obtained under the independent assumption, or under weak dependence conditions between the curves, which are satisfied by the usual functional time series models (functional autoregressive, functional ARCH, etc). As an application of the local regularity estimation, we discuss adaptive estimators for the mean, (auto)covariance functions, and the functional principal components. The extension to streaming data is also discussed.

16:45 ~ 17:00 Joint Discussion