Archive for Statistics Seminars MT 2021 – ST 2022

Michaelmas Term 2021

Friday 8 October 2021, 2-3pm - Professor Fang Yao

Biography

Title: Functional Linear Regression for Discretely Observed Data: From Ideal to Reality.

Absract: In this work, we give a new insight into estimation and prediction issues in functional linear regression (FLR) when the covariate process is discretely observed with noise. Without the fully observed functional data, it is difficult to derive a sharp bound for the estimated eigenfunctions, which makes the existing techniques for FLR unfeasible. We use pooling method to attain the estimated eigenfunctions without pre-smoothing each curve and propose a sample-splitting approach to estimate the component scores, which is novel for treating discretely observed data and facilitate the theoretical analysis. We then obtain the estimated slope function by the approximated least squared method. We show that the proposed method attains the optimal convergence rate as if the curves are fully observed for slope estimation and prediction error when the number of measurements per subject reach the magnitude which is determined the smoothness of the covariance and slope function, where is the number of subjects. This phase transition of the convergence rate is always between and , which differs from the phase transition of the pooled mean and covariance estimation at and reveals the elevated difficulties in estimating the slope function. We also evaluate the numerical performance of our proposed method using simulated and real data examples, yielding similar or favorable results when contrasted to comparable methods.

Lent Term 2022

Friday 25 February 2022, 3-4pm - Dr Zhimei Ren

Biography

Title: Sensitivity Analysis of Individual Treatment Effects: A Robust Conformal Inference Approach

Abstract: We propose a model-free framework for sensitivity analysis of individual treatment effects (ITEs), building upon ideas from conformal inference. For any unit, our procedure reports the Γ-value, a number which quantifies the minimum strength of confounding needed to explain away the evidence for ITE. Our approach rests on the reliable predictive inference of counterfactuals and ITEs in situations where the training data is confounded. Under the marginal sensitivity model of Tan (2006), we characterize the shift between the distribution of the observations and that of the counterfactuals. We first develop a general method for predictive inference of test samples from a shifted distribution; we then leverage this to construct covariate-dependent prediction sets for counterfactuals. No matter the value of the shift, these prediction sets (resp. approximately) achieve marginal coverage if the propensity score is known exactly (resp. estimated). We describe a distinct procedure also attaining coverage, however, conditional on the training data. In the latter case, we prove a sharpness result showing that for certain classes of prediction problems, the prediction intervals cannot possibly be tightened. We verify the validity and performance of the new methods via simulation studies and apply them to analyze real datasets.

This is joint work with Ying Jin and Emmanuel Candès.

Summer Term 2022

Friday 27 May 2022, 3-4pm - David Siegmund

Biography

Title: Detection, Estimation, and Segmentation of Changes

Abstract: We consider the problem of segmentation of a field of observations according to changes in their mean. Changes can occur continuously, e.g., a change in the slope of a regression line, a bump, or discontinuously, e.g., a jump in the level of a process. Theoretical results are illustrated by simulations and by applications to copy number changes, historical temperature time series, and incidence of hate

crimes. Confidence regions for the change-points and some difficulties associated with dependent observations will also be discussed. Aspects of this research involve collaboration with Fang Xiao, Li Jian, Liu Yi, Nancy Zhang, Benjamin Yakir, Li (Charlie) Xia, and Keith Worsley.

This event is hybrid and will take place in the Leverhulme Library COL 6.15.