CHANGE-POINT DETECTION: COMPUTATION AND STATISTICAL INFERENCE

Speaker: Xianyang Zhang
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Time：**Wednesday, Nov. 30th, 10-11:30 AM**
Venue: Tencent Meeting ID: 249-921-852   Password: 221130

Abstract:

Change-point analysis is concerned with detecting and locating structure breaks in the underlying model of a data sequence. It finds an abundance of applications in a wide variety of fields, for example, bioinformatics, finance, and engineering. This talk provides an overview of two different change-point detection frameworks in the literature. The first approach is based on minimizing a cost function over possible numbers and locations of change points. Such an approach requires finding the cost value repeatedly over different segments of the data set, which can be time-consuming. To tackle this issue, we introduce a new method based on sequential gradient descent to find the cost value accurately and efficiently. The core idea is to update the cost value using the information from previous steps without re-optimizing the objective function. Numerical studies show that the new approach can be orders of magnitude faster than the Pruned Exact Linear Time method without sacrificing estimation accuracy. The second approach combines two-sample hypothesis testing with segmentation techniques. A particular challenge within this framework is dealing with the high-dimensionality of data and the nonparametric nature of structure break. We develop a new methodology to detect structural breaks in the distributions of a sequence of high-dimensional observations. We show that the new approach is more efficient than the existing methods.

Biography:

Dr. Zhang is an Associate Professor in the Department of Statistics, Texas A&M University. His research has focused on high dimensional/large-scale statistical inference, kernel and distance-based methods, genomics and microbiome data analysis, functional data analysis, time series, and econometrics. His work has been published on prestigious statistics journals such as JASA, JRSSB, AoS, and Biometrika.