The Hong Kong Polytechnic University
Department of Applied Mathematics

Seminar

Testing high-dimensional covariate effects in the presence of covariate heterogeneity

By

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Abstract

In this talk, I introduce several tests for the mean effects of high-dimensional covariates on the response. In many applications, different components of covariates usually exhibit various levels of variation, which is ubiquitous in high-dimensional data. To simultaneously accommodate such heteroscedasticity and high dimensionality, we propose a novel test based on an aggregation of the marginal cumulative covariances, requiring no prior information on the specific form of regression models. Our proposed test statistic is scale-invariance, tuning-free and convenient to implement. The asymptotic normality of the proposed statistic is established under the null hypothesis. We further study the asymptotic relative efficiency of our proposed test with respect to the state-of-art universal tests in two different settings: one is designed for high-dimensional linear model and the other is introduced in a completely model-free setting. A remarkable finding reveals that, thanks to the scale-invariance property, even under the high-dimensional linear models, our proposed test is asymptotically much more powerful than existing competitors for the covariates with heterogeneous variances while maintaining high efficiency for the homoscedastic ones.

Biography

Prof. Zhu Liping is a Distinguished Scholar Special Professor at Renmin University of China, serving as the Dean, Professor, and Doctoral Supervisor of the Institute of Statistics and Big Data. Professor Zhu Liping has long been engaged in the fundamental theoretical research of big data statistics. His research fields include high-dimensional and ultra-high-dimensional data analysis, nonlinear dependent data analysis, and more. Professor Zhu Liping was selected for the National High-Level Talents Program and received support from the National Outstanding Young Scientist Fund. He has been invited to serve as the editorial board member, deputy editor, or area editor for several domestic and international academic journals such as "Annual Review of Statistics" and "Multivariate Statistical Analysis". He is currently the Vice President of the High Dimensional Data Statistics Branch and Survival Analysis Branch of the China On-site Statistics Research Association.

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Venue: TU101
Speaker: Prof. Liping Zhu, Renmin University of China
Host: Prof. Jian Huang, The Hong Kong Polytechnic University

*** * * ALL ARE WELCOME * * ***