



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS AND DATA SCIENCE

Nonparametric and Approximately Most Dominant Estimation with Shrinkage and Thresholding Effects: Applications to Wavelet Analysis and Linear Regression

By

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Abstract

In 1961, William James and Charles Stein shocked the statistical world by proving that the maximum likelihood estimate (MLE) is dominated by another estimator in high dimensions. The core idea of the James-Stein (JS) estimator is shrinkage. That inspired the development of different regularization techniques, including lasso. Not only does lasso shrink MLE towards zero, but also thresholds the small estimates to exact zero. The thresholding effect makes lasso achieve smaller risk than the JS estimator in the sparse signal setting.

In the normal mean estimation problem, both the JS estimator and lasso are special cases of a general family of estimators with shrinkage and thresholding effects (GEST). Here we consider the most dominant estimator among GEST. We demonstrated that the most dominant estimator is infeasible but can be approximated nonparametrically. The resulting estimator, namely NOMAD, is consistent under certain conditions and can dominate both the JS estimator and lasso in reducing the risk. The applications of NOMAD to wavelet analysis and linear regression are discussed in the presentation.

Biography

Dr. Wei Jiang is an Associate Research Scientist of Biostatistics at Yale University. He has general interests in developing statistical and computational methods for addressing important issues in biomedical research. His methodology research has focused on minimizing the approximate risk derived from empirical observations. As for applications, he developed multiple statistical and computational methods for analyzing data from genome-wide association studies (GWAS) to explore the genetic mechanisms of human diseases. His first-authored research works have been published in Nature Communications, American Journal of Human Genetics, Briefings in Bioinformatics, Statistica Sinica etc, and the paper for designing replication studies of GWAS received the Best Paper Award in the 14th Asia Pacific Bioinformatics Conference held in San Francisco, US.

Date : 30 November 2023 (Thursday)

Time : 10:00am

Venue : Room 2126D (Lift 19)

All are Welcome!