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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Expected Shortfall Random Forest for Heterogeneous Treatment Effect

By

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Abstract

Understanding heterogeneous treatment effects in the tail of a response distribution is crucial in many applications. As a comprehensive summary of the tail distribution, the expected shortfall (ES) is defined as the average over the tail above (or below) a certain quantile of a response distribution. Under the joint quantile and ES framework, we propose a novel expected shortfall random forest (ESRF) to model the nonlinear relationship between covariates and the ES of the response. The proposed ESRF approach integrates subsampling and data-splitting schemes to construct a nonparametric ensemble that jointly estimates conditional quantiles and expected shortfalls. Building upon this framework, we further develop the expected shortfall causal random forest (ESCRF) to estimate the conditional expected shortfall treatment effect, defined as the difference between the conditional ES of potential outcomes. We establish the pointwise consistency and the asymptotic normality for both the ESRF and the ESCRF estimators. We illustrate the finite-sample performance of the proposed methods through simulation studies and an empirical application examining health disparities among low-birthweight infants.

Date : 02 December 2025 (Tuesday)

Time : 10:00a.m.-11:00a.m.

Venue : Room 4504 (near Lift 25/26)

All are welcome!