

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Tuning-free Estimation and Inference of Cumulative Distribution Function under Local Differential Privacy

By

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<u>Abstract</u>

We introduce a novel algorithm for estimating Cumulative Distribution Function (CDF) values under Local Differential Privacy (LDP) by exploiting an unexpected connection between LDP and the current status problem, a classical survival data problem in statistics. This connection leads to the development of tools for constrained isotonic estimation based on binary queries. Through mathematical proofs and extensive numerical testing, we demonstrate that our method achieves uniform and \$L_2\$ error bounds when estimating the entire CDF curve. By employing increasingly dense grids, the error bound can be improved, exhibiting an asymptotic normal distribution of the proposed estimator. Theoretically, we show that the error bound smoothly changes as the number of grids increases relative to the sample size \$n\$. Computationally, we demonstrate that our constrained isotonic estimator can be efficiently computed deterministically, eliminating the need for hyperparameters or random optimization.

Bio: Dr. Linglong Kong is a Professor in the Department of Mathematical and Statistical Sciences at the University of Alberta, holding a Canada Research Chair in Statistical Learning and a Canada CIFAR AI Chair. He is a Fellow of the American Statistical Association (ASA) and the Alberta Machine Intelligence Institute (Amii), with over 120 peer-reviewed publications in leading journals and conferences such as AOS, JASA, JRSSB, NeurIPS, ICML, and ICLR. Dr. Kong received the 2025 CRM-SSC Prize for outstanding research in Canada. He serves as Associate Editor for several top journals, including JASA and AOAS, and has held leadership roles within the ASA and the Statistical Society of Canada. Dr. Kong's research interests include high-dimensional and neuroimaging data analysis, statistical machine learning, robust statistics, quantile regression, trustworthy machine learning, and artificial intelligence for smart health.

Date : 26 June 2025 (Thursday) Time : 3:00p.m. -4:00p.m. Venue : Room 2302 (Lift 17/18)

All are Welcome!