

High-Dimensional Knockoffs Inference for Time Series Data

Abstract

Business Distinguished Scholar Seminar Series

We make some initial attempt to establish the theoretical and methodological foundation for the model-X knockoffs inference for time series data. We suggest the method of time series knockoffs inference (TSKI) by exploiting the ideas of subsampling and e-values to address the difficulty caused by the serial dependence. We also generalize the robust knockoffs inference in Barber, Candès and Samworth (2020) to the time series setting to relax the assumption of known covariate distribution required by model-X knockoffs, since such an assumption is overly stringent for time series data. We establish sufficient conditions under which TSKI achieves the asymptotic false discovery rate (FDR) control. Our technical analysis reveals the effects of serial dependence and unknown covariate distribution on the FDR control. We conduct a power analysis of TSKI using the Lasso coefficient difference knockoff statistic under the generalized linear time series models. The finite-sample performance of TSKI is illustrated with several simulation examples and an economic inflation study. This is a joint work with Chien-Ming Chi, Yingying Fan and Ching-Kang Ing.

Jinchi Lv is Kenneth King Stonier Chair in Business Administration, Department Chair, Professor in Data Sciences and Operations Department of the Marshall School of Business at the University of Southern California, and Professor in Department of Mathematics at USC. He received his Ph.D. in Mathematics from Princeton University in 2007. He was McAlister Associate Professor in Business Administration at USC from 2016-2019. His research interests include statistics, data science, artificial intelligence, machine learning, and business applications as well as blockchain and large language models.

His papers have been published in journals in statistics, economics, business, computer science, information theory, neuroscience, and biology. He is the recipient of Fellow of Asia-Pacific Artificial Intelligence Association (2024), Distinguished Scholar (2024, Lingnan University), NSF Grant (2023), NSF Emerging Frontiers (EF) Grant (2022), Fellow of American Statistical Association (2020), NSF Grant (2020), Kenneth King Stonier Chair in Business Administration (2019), Fellow of Institute of Mathematical Statistics (2019), Member of USC University Committee on Appointments, Promotions, and Tenure (UCAPT, 2019-2024), USC Marshall Dean's Award for Research Impact (2017), Adobe Data Science Research Award (2017), McAlister Associate Professor in Business Administration (2016), Simons Foundation Grant (2016), the Royal Statistical Society Guy Medal in Bronze (2015), NSF Faculty Early Career Development (CAREER) Award (2010), USC Marshall Dean's Award for Research Excellence (2009), Journal of the Royal Statistical Society Series B Discussion Paper (2008), NSF Grant (2008), and Zumberge Individual Award from USC's James H. Zumberge Faculty Research and Innovation Fund (2008). He has served as an associate editor of Operations Research (2024-present), Journal of the American Statistical Association (2023-present), Journal of Business & Economic Statistics (2018-2024), The Annals of Statistics (2013-2018), and Statistica Sinica (2008-2016).

Biography



Prof Lv Jinchi

Professor of Data Sciences and Operations
Marshall School of Business
University of Southern California

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