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THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

SOFARI-R: High-Dimensional Manifold-Based Inference for Latent Responses

By

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Abstract

Data reduction with uncertainty quantification plays a key role in various multi-task learning applications, where large numbers of responses and features are present. To this end, a general framework of high-dimensional manifold-based SOFAR inference (SOFARI) was introduced recently in Zheng, Zhou, Fan and Lv (2024) for interpretable multi-task learning inference focusing on the left factor vectors and singular values exploiting the latent singular value decomposition (SVD) structure. Yet, designing a valid inference procedure on the latent right factor vectors is not straightforward from that of the left ones and can be even more challenging due to asymmetry of left and right singular vectors in the response matrix. To tackle these issues, in this paper we suggest a new method of high-dimensional manifold-based SOFAR inference for latent responses (SOFARI-R), where two variants of SOFARI-R are introduced. The first variant deals with strongly orthogonal factors by coupling left singular vectors with the design matrix and then appropriately rescaling them to generate new Stiefel manifolds. The second variant handles the more general weakly orthogonal factors by employing the hard-thresholded SOFARI estimates and delicately incorporating approximation errors into the distribution. Both variants produce bias-corrected estimators for the latent right factor vectors that enjoy asymptotically normal distributions with justified asymptotic variance estimates. We demonstrate the effectiveness of the newly suggested method using extensive simulation studies and an economic application. This is a joint work with Zemin Zheng and Xin Zhou.

Short bio *(http://faculty.marshall.usc.edu/jinchi-lv/):*

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).

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Venue : Room 2504 (Lift 25/26)