Data-Driven Optimal Allocation via Balancing Empirical Large Deviations in Sequential Selection

Dr. CHEN Ye
Assistant Professor,
Statistical Sciences and Operations Research,
Virginia Commonwealth University, USA

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Abstract

The ranking and selection problem is a classic mathematical framework about identifying the best alternative from multiple alternatives through sampling them. However, the uncertainty about sampling distributions in the ranking and selection problem has been relatively overlooked and related research is just starting to gain momentum recently. We for the first time propose a computationally-tractable data-driven nonparametric tuning-free sequential budget allocation strategy under unknown light-tailed sampling distributions. Furthermore, we theoretically prove that our methodology achieves the optimal allocation specified by large deviation analysis. Especially, we propose a new efficient point estimation procedure for estimating the optimal large deviation rates in ranking and selection and theoretically demonstrate its validity.

About the Speaker

Ye Chen is an Assistant Professor of Statistical Sciences and Operations Research at Virginia Commonwealth University. He received a Ph.D. in Statistics from University of Maryland in 2018. His research interests include stochastic optimization, machine learning, data science, and their applications in areas such as transportation, online service management and public sector operations. He was a finalist in the Best Theoretical Paper Award competition at the 2016 Winter Simulation Conference and a winner of the 2022 INFORMS Transportation Science & Logistics Best Paper Award.