Cleveland State University
College of Science

COLLOQUIUM

Sakshi Arya, Ph.D.

Assistant Professor

Dept. of Mathematics, Applied Mathematics, and Statistics

Case Western Reserve University

Single-Index based Semiparametric Batched Bandits

Friday May 2nd at 2:30pm in RT 1516

Bio: Dr. Arya is an Assistant Professor of Statistics in the Department of Mathematics, Applied Mathematics and Statistics at Case Western Reserve University. She received her PhD in Statistics at the University of Minnesota in May 2020 advised by Prof. Yuhong Yang. Before joining Case, she spent two years as a postdoctoral fellow at Penn State working at the intersection of sequential decision making and kernel methods with Prof. Bharath Sriperumbudur. Before that, she spent some time as a postdoctoral scholar in 2021 working on climate modeling for hurricanes with Prof. Snigdhansu Chatterjee. Her main research interests are sequential decision-making problems in particular contextual bandit problems, nonparametric statistics, statistical learning theory, inverse problems and machine learning.

Abstract: The multi-armed bandits (MAB) framework is a widely used approach for sequential decision-making, where a decision-maker selects an arm in each round with the goal of maximizing long-term rewards. Moreover, in many practical applications, such as personalized medicine and recommendation systems, feedback is provided in batches, contextual information is available at the time of decision-making, and rewards from different arms are related rather than independent. In order to handle the curse of dimensionality for nonparametric regressions in contextual bandit problems, we propose a novel semi-parametric bandit approach to handle sequential-decision making problems in the batched bandit setting. Here, we assume that for each arm, the relationship between the covariates and responses can be modeled in the reduced 1-dimensional subspace (effective dimension reduction subspace) based on the single-index regression framework. Consequently, we adopt an adaptive binning and successive elimination algorithm for the sequential decision-making along the estimated single-index direction. We provide optimal regret guarantees on our proposed algorithm and illustrate the performance on simulated and real datasets.

Coffee available in RT 1517 before the talk at 2:00pm