THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

PHD STUDENT SEMINAR

Split Knockoffs for Transformational Sparsity in Generalized Linear Models

By

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Abstract

In many real-world applications, controlling the false discovery rate (FDR) in the raw parameter space is insufficient, as constraints are often required in a transformed parameter space. Examples include gene pathway detection and connection analysis in MRI data. While the knockoff and Model-X knockoff frameworks provide theoretical guarantees for FDR control in finite samples, enabling their use in complex models such as generalized linear models (GLMs), they are limited to the original parameter space and are not well-suited for transformational sparsity. Conversely, Split Knockoff addresses transformational sparsity but is restricted to linear models and cannot handle more complex scenarios.

To overcome these limitations, we propose Model-X Split Knockoff, a novel framework that incorporates variable splitting with the introduction of an auxiliary design. This decomposition enables the application of FDR control to GLMs while accommodating transformational sparsity. Additionally, Model-X Split Knockoff provides an alternative knockoff construction method for distributions that are challenging to estimate under the original Model-X knockoff framework. We evaluate the performance of Model-X Split Knockoff through both simulation studies and real-world applications, including Alzheimer's Disease analysis and College Rank data, demonstrating its effectiveness and versatility.

Date : 10 April 2025 (Thursday)
Time : 4:00pm
Venue : Room 5506 (near Lifts 25/26)

All are Welcome!