Rashomon and the UNIVERSE of Madness: Variable Importance with Unobserved Confounding and the Rashomon Effect

Srikar Katta

Duke University

Thursday April 2, 2026
12:00 pm **Room 3-E4-SR03** Via Roentgen 1 Milano

Abstract

Variable importance (VI) methods are often used for hypothesis generation, feature selection, and scientific validation. In the standard VI pipeline, an analyst estimates VI for a single predictive model with only the observed features. However, the importance of a feature depends heavily on which other variables are included in the model, and essential variables are often omitted from observational datasets. Moreover, the VI estimated for one model is often not the same as the VI estimated for another equally-good model - a phenomenon known as the Rashomon Effect. We address these gaps by introducing UNobservables and Inference for Variable importancE using Rashomon SEts (UNIVERSE). Our approach adapts Rashomon sets - the sets of near-optimal models in a dataset - to produce bounds on the true VI even with missing features. We theoretically guarantee the robustness of our approach, show strong performance on semi-synthetic simulations, and demonstrate its utility in a credit risk task. This is joint work with Jon Donnelly, Cynthia Rudin, and Emanuele Borgonovo and will discuss work from the following paper: https://arxiv.org/abs/2510.12734