RUTGERS–NEW BRUNSWICK
School of Arts and Sciences

Department of Statistics

Department of Statistics Seminar Series

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Causal Inference with Video Features as Treatments

Wednesday, October 7th, 2026
12:10-1:30 PM
Hill Center - 116
Light refreshments will be served in Hill Center 452 at 11:40am

Abstract:

We develop the first statistical methodology for causal inference with video features as treatments, examining how features unfolding over time affect audience responses. Standard methods cannot accommodate latent, high-dimensional confounders dynamically related to treatment sequences and outcome trajectories. We reproduce each video using a deep generative model and use its internal representations as low-dimensional content summaries for causal estimation. We establish nonparametric identification of average potential-outcome trajectories under dynamic stochastic interventions and propose a consistent, asymptotically normal estimator using a longitudinal neural network. We validate the approach with a new benchmark comprising 10,000 Super Mario Bros. levels played by fixed AI agents, with known ground-truth causal effects. Applying our method to 2020 U.S. presidential campaign television advertisements, we find that increasing the probability of candidate appearances over time improves average viewer evaluations. Our methodology enables researchers to investigate which visual features influence audience responses and when, while providing a benchmark for evaluating new methods.

Bio:

Kosuke Imai is Edith and Benjamin Geisinger Professor of Government and of Statistics at Harvard University. He is also an affiliate of the Institute for Quantitative Social Science. Before moving to Harvard in 2018, Imai taught at Princeton University for 15 years, where he was the founding director of the Program in Statistics and Machine Learning. In addition, Imai served as the President of the Society for Political Methodology from 2017 to 2019 and was elected as a fellow of the society in 2017.

Imai has authored two widely used undergraduate introductory statistics textbooks for social scientists, Quantitative Social Science: An Introduction (Princeton University Press, 2017) and Data Analysis for Social Science: A Friendly and Practical Introduction (with Elena Llaudet; Princeton University Press, 2022). He has published more than 100 peer-refereed journal articles in political science, statistics, and other fields, and authored over twenty open-source software packages. Imai has been recognized as a highly cited researcher by Clarivate Analytics since 2018. He has won several awards, including the Warren Miller Prize (2008), the Pi Sigma Alpha Award (2013), the Excellence in Mentoring Award (2021), the Guggenheim Fellowship (2024), and was the inaugural recipient of the Society for Political Methodology's Emerging Scholar Award (2011). Imai's research has been supported by National Science Foundation grants as well as grants from other government agencies and private organizations.