University of California, Irvine
Statistics Seminar

Causal Inference on Distribution Functions

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Understanding causal relationships is one of the most important goals of modern science. So far, the causal inference literature has focused almost exclusively on outcomes coming from the Euclidean space. However, it is increasingly common that complex biomedical datasets are best summarized as data points in non-linear spaces. In this paper, we present a novel framework of causal effects for outcomes from the Wasserstein space of cumulative distribution functions, which in contrast to the Euclidean space, is non-linear. We develop doubly robust estimators and associated asymptotic theory for these causal effects. As an illustration, we use our framework to quantify the causal effect of marriage on physical activity patterns using wearable device data collected through the National Health and Nutrition Examination Survey.