Functional Data Analysis, Causal Inference and Brain Connectivity

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Abstract

Functional data analysis (FDA) and causal inference are two areas that have received substantial interest in the statistics literature lately. However, to date, both remain relatively underutilized in the neuroimaging community. This talk illustrates several neuroimaging applications in which both FDA and causal inference promise to play an important role. We conclude with the introduction of a functional path analysis model for studying brain connectivity, which extends the standard structural equation model framework to the functional data setting. We use the potential outcomes notation of causal inference to determine the assumptions required to obtain a valid estimate of the average causal effect from the functional path analysis model.