

Challenges of Mediation Analysis in Neuroimaging Studies

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Causal mediation analysis is widely applied to assess the causal mechanism among three variables: a treatment, an intermediate (i.e., a mediator), and an outcome variable. In neuroimaging studies, neuroscientists are interested in identifying the brain regions that are responsive to an external stimulus, as well as in discovering the pathways that are involved in processing the signals. Functional magnetic resonance imaging (fMRI) is often used to infer brain connectivity, however, mechanistic analysis is challenging given the hierarchically nested data structure, the great number of functional brain regions, and the complexity of data output in the form of times series or functional data. Causal mediation methods in big data contexts are scarce. In this presentation, we will discuss the challenges and some novel causal mediation approaches aiming to address this methodological gap.