

Causal Inference For Heterogeneous Disease Etiology

Modern disease etiology studies have shown that the effect an exposure (e.g. smoking) may have on a disease can vary for different subtypes. However, existing approaches used to investigate etiology, yield estimands that do not correspond to causal effects. This is because of a selection bias mechanism likely to arise in disease heterogeneity studies. In this talk, we propose an alternative approach for estimating and comparing the causal effects an exposure may have on disease subtypes. To this end, we develop the Subtype-Free Average Causal Effect (SF-ACE), a well-defined causal effect among the individuals who would have been free of the other disease subtype under either exposure level. To demonstrate the utility of our methodology, we propose identification and estimation approaches for the SF-ACE of smoking on colorectal cancer subtyped by microsatellite status, along with a sensitivity analysis to relax some of these assumptions.