

Doubly robust patient-specific treatment effect estimation for time-to-event outcome with competing risks

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Abstract

Various statistical methods have been suggested to estimate causal treatment effects from observational data. These methods are categorized into outcome-based modeling, treatment-based modeling, or outcome- and treatment-based modeling with doubly robust feature. However, most doubly robust methods do not consider treatment-effect heterogeneity in time-to-event data with competing risks. In this talk, we present a framework that uses targeted maximum likelihood estimation and meta-algorithms to estimate conditional causal average treatment effects based on patient characteristics. Our approach also incorporates machine learning methods for both outcome and treatment modeling. Simulation studies show that our method outperforms others, even when the outcome model is misspecified. We demonstrate the application of our method in a study of treatment effects for sepsis patients in the ICU.