Mediation analysis for time-to-event data

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摘要： Semi-competing risks refer to the phenomenon that the terminal event (such as death) can truncate the non-terminal event (such as disease progression) but not vice versa. The treatment effect on the terminal event can be delivered either directly following the treatment or indirectly through the non-terminal event. We consider two strategies to decompose the total effect into a direct effect and an indirect effect under the framework of mediation analysis, by adjusting the prevalence and hazard of non-terminal events, respectively. They require slightly different assumptions on cross-world quantities to achieve identifiability. We establish asymptotic properties for the estimated counterfactual cumulative incidences and decomposed treatment effects. Through simulation studies and real-data applications we illustrate the subtle difference between these two decompositions. We also discuss the interpretations of direct and indirect effects under the framework of separable effects.

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