

國立中山大學應用數學系

學術演講

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講題：Modeling natural history of hepatitis

時間：2021/05/06（Thursday）14:10 ~ 15:00

地點：理學院四樓理 SC 4009-1 教室

茶會：13:30 於理 SC 4010 室（系辦公室）

Abstract

Natural history of human disease is comprised of several milestones of sequential events where these milestones are all time-to-event by nature. For example, from hepatitis C infection to death, patients may experience intermediate events such as liver cirrhosis and liver cancer. The events of hepatitis, cirrhosis, cancer and death have the sequential order and are subject to right censoring; moreover, the latter events may mask the former ones. By casting the natural history of human diseases in the framework of causal mediation modeling, we set up a mediation model with intermediate events and a terminal event, respectively as the mediators and the outcome. By introducing counterfactual counting processes, we define the intervention analogue of path-specific effects (iPSEs) as the effect of the exposure on the terminal event mediated by any combination of the intermediate events, including not through any of the events. We derive the expression of the counterfactual hazard. We construct composite nonparametric likelihood and derive a Nelson-Aalen type of estimator for the counterfactual hazard. We establish the asymptotic unbiasedness, uniform consistency and weak convergence for the proposed estimators. Numerical studies including simulation and data application of a hepatitis study conducted in Taiwan are presented to illustrate the finite sample performance and utility of the proposed method.

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