國立成功大學統計學系
專題演講

時　間：110 年 10 月 21 日 (星期四) 下午 3:30 – 4:30
地　點：統計學系三樓視聽教室 (62331)
演講者：戴安順 博士
　　國立陽明交通大學統計學研究所
題　目：Two methodologies of causal mediation analysis: on the relaxation of the exchangeability assumption and the completeness of the survival mediation parameter

茶　會：下午 3:00 – 3:25 (統計學系二樓教師休息室)

Abstract

Mediation analysis is a powerful technique to assess how exposure affects the outcome of interest mediated through an intermediated variable (mediator). By incorporating with the counterfactual model, causal mediation analysis can further yield substantial insight into the causal mechanism through the assessment of natural direct and indirect effects.

In this talk, I will show two critical problems for causal mediation analysis and propose solutions. The first problem arises from the assumptions regarding no unmeasured mediator – outcome confounding and no intermediate mediator – outcome confounding. The conventional methodology of causal mediation analysis is invalid if these assumptions cannot be satisfied. However, checking these assumptions presents practical challenges. To address this problem, a novel instrumental blocker, a novel quasi-instrumental variable, is introduced to relax both of these assumptions. A multiply robust estimation method is derived to mitigate the model misspecification problem. As an illustration, we apply the proposed method to genomic datasets of lung cancer to investigate the potential role of the epidermal growth factor receptor in the treatment of lung cancer. The second problem discussed in this talk is about death truncation. In longitudinal studies, the problem of truncation by death arises when individuals die between follow-up visits. Some variables may not be well-defined for dead individuals, and in such a condition, the conventional mediation method cannot be applicable. A novel approach is proposed to redefining natural direct and indirect effects, which are generalized forms of conventional causal effects for survival outcomes.

Furthermore, three statistical methods are developed for the binary outcome of survival status and formulated a Cox model for survival time. The proposed method is applied to explore the effect of hepatitis C virus infection on mortality, as mediated through hepatitis B viral load.

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