國立中山大學應用數學系
學術演講

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講　題：Error control for sequential trials

時　間：2019/12/18（Wednesday）14:10～15:00

地　點：理學院四樓理 SC 4009-1 室

茶　會：15:00 於理 SC 4010 室（系辦公室）

Abstract

In many areas of biomedical research, trials accumulate data gradually over time. Hence there is the possibility of monitoring the results and making decisions in a sequential manner based on the interim data. Running trials in this way can yield substantial ethical and economic advantages. However, a barrier to using sequential trials is the need to ensure control of a suitable error rate when formally testing the hypotheses of interest. In this talk, I discuss recent methodological advances in error control for two sequential trial settings.

Firstly, I present work on familywise error rate (FWER) control for response-adaptive clinical trials. In such trials, the randomisation probabilities to the different treatments arms are sequentially updated using the accumulating response data. I propose adaptive testing procedures that ensure strong familywise error control, for both fully-sequential and block-randomised trials. I show that

there can be a high price to pay in terms of power to achieve FWER control for randomisation schemes with extreme allocation probabilities. However, for proposed Bayesian adaptive randomisation schemes in the literature, the adaptive tests maintain the power of the trial.

Secondly, I compare and contrast recently proposed procedures for false discovery rate (FDR) control in trials with online hypothesis testing. In this setting, a sequence of hypotheses is tested and the investigator has to decide whether to reject the current null hypothesis without having access to the future p-values or even the number of hypotheses to be tested. A key example is the perpetual platform trial design, which allows multiple treatment arms to be added during the course of the trial. Using simulation scenarios and case studies, I provide recommendations for which procedures to use in practice for online FDR control.

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