Propensity Score: an Alternative Method of Analyzing Intervention Effect

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Abstract:

There is agreement in medical research that the preferred method for evaluating interventions is the randomized controlled trial. Randomization is the only method that guarantees similar distributions of known and unknown patient characteristics between an intervention and a control group thus enabling true causal statements on intervention effects. However, randomized controlled trials are in some cases "unnecessary, inappropriate, impossible, or inadequate" and have also been criticized for a lack of external validity: Patients in randomized controlled trials are usually younger and healthier than the average patient. Non-randomized studies can be an alternative here, however, they suffer from a lack of internal validity: Treatment allocation is not randomized and the intervention and control groups may be systematically different in terms of known and (even worse) unknown patient characteristics. A range of statistical procedures have been developed to take account of these differences during analysis. The standard procedures for this are multiple regression models, however, propensity scores (PS) are also increasingly used. The propensity score is defined as the probability that a patient receives the intervention under investigation. In a first step, the PS is estimated from the available data, e.g. in a logistic regression model. In a second step, the actual intervention effect is estimated with the aid of the PS. In this talk, we give a short, non-technical introduction to the propensity score using an example from coronary bypass surgery.