

The hidden role of the propensity score

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Abstract

Propensity scores play two overt roles in the analysis of observational studies, helping to avoid extrapolation and balancing the co-variates. In the absence of hidden bias they are thought also to play an important hidden role, rearranging the sample in such a way that matched comparisons of an intervention and a control group behave statistically as if randomization had allocated the matched counterparts to their respective treatment conditions. In general it is not possible, as is shown here, to match so closely as to validate the propensity matching/matched experiment analogy as it is commonly invoked. By matching closely enough on the propensity score, on the other hand, one can secure the validity of certain kinds of permutation- and randomization-type inferences. These points emerge from a new large-sample theory that links the propensity score's overt and hidden roles. Propensity score matches can be rather crude and still close enough, but they must be arranged with attention both to balance and to extrapolation. Some common measures of covariate balance will do, although others won't; and the proper countermeasures against extrapolation that differ distinctly from those currently in use, being sometimes stricter and sometimes more permissive.