An Algorithm to Compute the Likelihood Ratio Test Statistic of the Sharp Null Hypothesis for Compliers

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Abstract

In a randomized experiment with noncompliance, scientific interest is often in testing whether the treatment exposure $X$ has an effect on the final outcome $Y$. We have proposed a finite-population significance test of the sharp null hypothesis that $X$ has no effect on $Y$, within the principal stratum of compliers, using a generalized likelihood ratio test. As both the null and alternative hypotheses are composite hypotheses (each comprising a different set of distributions), computing the value of the generalized likelihood ratio test statistic requires two maximizations: one where we assume that the sharp null hypothesis holds, and another without making such an assumption.

In our work, we have assumed that there are no Always Takers, such that the nuisance parameter is a bivariate parameter describing the total number of Never Takers with observed outcomes $y = 0$ and $y = 1$. Extending the approach to the more general case in which there are also Always Takers would require a nuisance parameter of higher dimension that describes the total number of Always Takers with observed outcomes $y = 0$ and $y = 1$ as well. This increases the size of the nuisance parameter space and the computational effort needed to find the likelihood ratio test statistic.

We present a new algorithm that extends to solve the corresponding integer programs in the general case where there are Always Takers. The procedure for the finite-population significance test may be illustrated using a toy example from.

References


