Multiple Imputation Confidence Intervals for the Mean of the Discrete Distributions for Incomplete Data

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Abstract

Confidence intervals for the mean of discrete exponential families are widely used in many applications. Since missing data are commonly encountered, the interval estimation for incomplete data is an important problem. The performances of the existing multiple imputation confidence intervals are unsatisfactory. We propose modified multiple imputation confidence intervals to improve the existing confidence intervals for the mean of the discrete exponential families with quadratic variance functions. A simulation study shows that the coverage probabilities of the modified confidence intervals are closer to the nominal level than the existing confidence intervals when the true mean is near the boundaries of the parameter space. In addition, we also propose a proper multiple imputation procedure for the method of variance estimates recovery to estimate confidence intervals for difference between effect measures, not only for missing at random, but also for missing not at random. These confidence intervals are illustrated with real data examples.