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Empirical likelihood meta-analysis with publication bias correction under Copas-like selection model

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Abstract

Meta-analysis is commonly used to synthesize multiple results from individual studies. However, its validation is usually threatened by publication bias and between-study heterogeneity, which can be captured by the Copas selection model. Existing inference methods under this model are all based on conditional likelihood and may not be fully efficient. In this paper, we propose a full likelihood approach to meta-analysis by integrating the conditional likelihood and a marginal semi-parametric empirical likelihood under a Copas-like selection model. We show that the maximum likelihood estimators (MLE) of all the underlying parameters have a jointly normal limiting distribution, and the full likelihood ratio follows an asymptotic central chi-square distribution. Our simulation results indicate that compared with the conditional likelihood method, the proposed MLEs have smaller mean squared errors and the full likelihood ratio confidence intervals have more accurate coverage probabilities. A real data example is analyzed to show the advantages of the full likelihood method over the conditional likelihood method.

Keywords Copas selection model · Empirical likelihood · Meta-analysis · Publication bias · Trim-and-fill method

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