

A highly accurate simple small area confidence interval method

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We introduce a new adjusted residual maximum likelihood method in the context of producing an empirical Bayes confidence interval for a normal mean, a problem of great interest in different small area applications. Like other rival empirical Bayes confidence intervals such as the well-known parametric bootstrap method, the proposed interval is second-order correct. The proposed interval is carefully constructed so that it always produces an interval shorter than the corresponding maximum likelihood based direct confidence interval, a property not analytically proved for other competing methods. Moreover, the proposed method is not simulation-based and requires only a fraction of computing time needed for the parametric bootstrap confidence interval. A Monte Carlo simulation study demonstrates the superiority of the proposed method over other competing methods.

Key words: Coverage error, empirical Bayes, linear mixed model