

Bias and variance reduction techniques for bootstrap information criteria

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Abstract We discuss the problem of constructing information criteria by applying the bootstrap methods. Various bias and variance reduction methods are presented for improving the bootstrap bias correction term in computing the bootstrap information criterion. The properties of these methods are investigated both in theoretical and numerical aspects, for which we use a statistical functional approach. It is shown that the bootstrap method automatically achieves the second-order bias correction if the bias of the first-order bias correction term is properly removed. We also show that the variance associated with bootstrapping can be considerably reduced for various model estimation procedures without any analytical argument. Monte Carlo experiments are conducted to investigate the performance of the bootstrap bias and variance reduction techniques.

Keywords Kullback–Leibler information · AIC · Information criteria · Bootstrapping · Statistical functional · Variance reduction · Higher-order bias correction