

# Deviance Information Criteria for Model Selection in Approximate Bayesian Computation

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Approximate Bayesian computation (ABC) is a class of algorithmic methods in Bayesian inference using statistical summaries and computer simulations. ABC has become popular in evolutionary genetics and in other branches of biology. However model selection under ABC algorithms has been a subject of intense debate during the recent years. Here we propose novel approaches to model selection based on posterior predictive distributions and approximations of the deviance. We argue that this framework can settle some contradictions between the computation of model probabilities and posterior predictive checks using ABC posterior distributions. A simulation study and an analysis of a resequencing data set of human DNA show that the deviance criteria lead to sensible results in a number of model choice problems of interest to population geneticists.

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