

Approximate Bayesian Computation for Model Choice

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Approximate Bayesian Computation (ABC) (or "likelihood-free" Bayesian inference) is rapidly becoming a popular and powerful tool for the Bayesian analysis of models with computationally intractable likelihood functions but from which it is possible to simulate data. ABC is conceptually simple and easy to implement. It is having a major impact in applied science across a broad spectrum of disciplines. We will first present an introduction and overview of ABC techniques. We will describe the concepts behind the methods as well as providing insight into the choice of the various components, such as summary statistics and algorithms, to which an ABC analysis can be sensitive. The second part of the talk will give some new approaches for usefully extending the practicality of current ABC methods into applications involving model choice. In a Bayesian context this involves computation of the Bayes factor, a well known difficult computation. For ABC model choice the selection of summary statistics is very important. Some examples involving disease and pathogen transmission will be considered where the likelihood is intractable. Based on case occurrence data, the choice between different models of transmission can be determined using ABC methods.

Key Words: Bayes factor, disease transmission model, Monte Carlo, summary statistics