Abstract:

"Approximate Bayesian Computation and consistent model selection"

Approximate Bayesian computation (ABC), also known as likelihood-free methods, has become a standard tool for the analysis of complex models, primarily in population genetics but also for complex financial models.

The development of new ABC methodology is undergoing a rapid increase in the past years, as shown by multiple publications, conferences and even softwares. While one valid interpretation of ABC based estimation is connected with nonparametrics, the setting is quite different for model choice issues. We examined in Grelaud et al. (BA, 2009) the use of ABC for Bayesian model choice in the specific of Gaussian random fields (GRF), relying on a sufficient property to show that the approach was legitimate.

Despite having previously suggested the use of ABC for model choice in a wider range of models in the DIY ABC software (Cornuet et al., 2008), we present in Robert et al. (PNAS, 2011) theoretical evidence that the general use of ABC for model choice is fraught with danger in the sense that no amount of computation, however large, can guarantee a proper approximation of the posterior probabilities of the models under comparison. In a more recent work (Marin et al., 2011), we expand on this warning to derive necessary and sufficient conditions on the choice of summary statistics for ABC model choice to be asymptotically consistent.