Department of Decision Sciences

Statistics Seminars

Summary statistics and discrepancy measures for approximate Bayesian computation via surrogate posteriors

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Abstract

Choosing informative summary statistics is a key and challenging task for successful inference via ABC algorithms. An important line of research towards automatic learning of summary statistics has started in the seminal paper of Fearnhead and Prangle [2012]. Their semi-automatic ABC approach targets approximations of the posterior mean as an optimal summary statistic under a quadratic loss. In this work, we propose to go beyond summary statistics as point estimators and consider functional summary statistics. Approximations of the full posterior distributions are used as such functional summaries. The parametric framework used to provide these approximations is a family of Gaussian mixtures. The whole procedure can be seen as an extension of the semi-automatic ABC framework and can also be used as an alternative to sample-based ABC approaches. The resulting ABC quasi-posterior distribution is shown to converge to the true one, under standard conditions. Performance is illustrated on both synthetic and real data sets, where it is shown that our approach is particularly useful when the posterior is multimodal. This is joint work with Hien Nguyen, TrungTin Nguyen and Julyan Arbel.