

Abstract

Parameter inference for time series is a notoriously difficult problem and often standard algorithm, e.g. Markov Chains Monte Carlo (MCMC) methods perform poorly (processing speed is slow). In this paper, we examine the recently proposed Expectation-Propagation ABC (EP-ABC) algorithm for likelihood-free Bayesian inference for time series.

EP-ABC algorithm is an adaptation of the Expectation Propagation (EP) algorithm to the likelihood-free setting. The main advantage of EP-ABC is that it is faster than standard algorithm by a few orders of magnitude and at the same time, provides good approximation of the posterior distribution. However, as the convergence of EP-ABC is not yet fully understood, users have to be mindful and take special care when performing EP-ABC.

This paper provides readers with substantial knowledge of EP-ABC. Furthermore, two case studies will be studied extensively to evaluate the performance of EP-ABC on time series. The first case study allows readers to gain a better understanding on how EP-ABC can be applied to a time series model and to ensure sensible workings of EP-ABC on the time series model. The second case study shows the potential of EP-ABC when an intractable model of interest is considered.

Key-words: Exponential Family of Distribution; Kullback-Leibler Divergence; Expectation Propagation; Approximate Bayesian Computation; Self-Normalised Importance Sampling.