Bayesian change point analysis of time series

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Abstract

In this work we consider time series with discrete point changes which may contain a finite number of changes of probability density functions (pdf). We focus on the case where the data in all segments are modeled by Gaussian probability density functions with different means, variances and correlation lengths. The problem as we stated can also be considered as an unsupervised classification and/or segmentation of the time serie. We put a prior law on the change point occurances (Poisson process) as well as on these different parameters (conjugate priors) and give the expression of the posterior probality distributions of these change points as well as those of the unknown parameters. The computations are done by using an appropriate Markov Chain Monte Carlo (MCMC) technique.

keywords. Bayesian change-points estimation, classification and segmentation of time series.