

# A Bayesian classification approach to change points detection in time series

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## Abstract

Change points detection in time series is an important area of research in statistics, has a long history and has many applications. However, very often change point analysis is only focused on the changes in the mean value of some quantity in a process. 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. We put a prior law on the change point occurrences (Poisson process) as well as on these different parameters (conjugate priors) and give the expression of the posterior probability distributions of these change points. The computations are done by using an appropriate Markov Chain Monte Carlo (MCMC) technique.

The problem as we stated can also be considered as an unsupervised classification and/or segmentation of the time serie. This analogy gives us the possibility to propose alternative modeling and computation of change points.

## key words:

Change point analysis, Bayesian classification and segmentation, Time series analysis.