

Segmentation of time-series with dependence

S. Chakar, X. Collilieux, E. Lebarbier, C. Lévy-Leduc and S. Robin

The objective of segmentation methods is to detect abrupt changes, called breakpoints, in the distribution of a signal. Such segmentation problems arise in many areas, as in biology, in climatology, in geodesy, The inference of segmentation models requires to search over the space of all possible segmentations, which is prohibitive in terms of computational time, when performed in a naive way. The Dynamic Programming (DP) strategy is the only one that retrieves the exact solution in a fast way but only applies when the contrast (e.g. the log-likelihood) to be optimized is additive with respect to the segments. However, this is not the case in presence of some dependencies. We consider two cases:

- (i) When dealing with time-series, it is likely that time-dependence exists.
- (ii) When dealing with multiple series, it is likely that some dependence between series exists (as spatial correlation).

Our goal is to propose an efficient maximum likelihood inference procedure. For both our strategy consists in removing the dependence such that DP can be applied during the inference procedure.