BAYESIAN SMOOTHING ALGORITHMS IN PARTIALLY OBSERVED MARKOV CHAINS

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Abstract

An important problem in signal processing consists in estimating an unobservable process x from an observed process y. In Hidden Markov Chains (HMC), efficient Bayesian smoothing restoration algorithms have been proposed in the discrete [1] as well as in the Gaussian case [2] [3].

Among other extensions of HMC, Triplet Markov Chains (TMC) have been introduced recently (see e.g. [4]). In a TMC we assume that the triplet (x, r, y) (in which r is some additional process) is a Markov Chain (MC). So a TMC can be seen as a vector MC, in which one observes some components y and one wants to restore some part of the remaining components. In a TMC the marginal process (x, r) is not necessarily an MC, but the conditional law of (x, r) given the observations y is an MC; as in HMC, this key computational property enables the development of efficient restoration or parameter estimation algorithms. This paper addresses fixed-interval smoothing algorithms in TMC and is a continuation of the work of [5]. In particular, we extend to Gaussian TMC the Bryson and Frazier algorithm, the backward-forward RTS algorithm, the Fraser and Potter algorithm and the backward-forward RTS algorithm of Desai *et al.*

References:

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Key Words: Hidden Markov Chains, state-space models, Markovian models, smoothing algorithms.