Stepwise Signal Extraction via Marginal Likelihood

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Abstract

We study the estimation of stepwise signal. To determine the number and locations of change-points of the stepwise signal, we formulate a maximum marginal likelihood estimator, which can be computed with a quadratic cost using dynamic programming. We carry out extensive investigation on the choice of the prior distribution and study the asymptotic properties of the maximum marginal likelihood estimator. We propose to treat each possible set of change-points equally and adopt an empirical Bayes approach to specify the prior distribution of segment parameters. Detailed simulation study is performed to compare the effectiveness of this method with other existing methods. We demonstrate our method on DNA array CGH data. Our study shows that this method is applicable to a wide range of models and offers appealing results in practice. Joint work with S.C. Kou and C. Du.