

Selection of the number of change-points via error rate control

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Abstract: In multiple change-point analysis, one of the main difficulties is to determine the number of change-points. Various consistent selection methods, including the use of Schwarz information criterion or cross-validation have been proposed to balance the model fitting and complexity. However, there is a lack of systematic approach to providing "significance" information in determining the number of changes. I will introduce a data-adaptive selection procedure via error rate control, which is applicable to most kinds of popular change-point algorithms. The key idea is to apply the order-preserved sample-splitting strategy to construct a series of statistics with marginal symmetry property and then to utilize the symmetry for constructing a data-driven threshold. The false discovery rate (FDR) control is detailedly investigated and some other error rates are also discussed. We show that the proposed method is able to, at least asymptotically, control the FDR under certain conditions and still retain all of the true change-points. Some important examples are presented to illustrate the merits of our procedure. Numerical experiments indicate that the proposed methodology works well for many existing change-detection methods and is able to yield accurate FDR control in finite samples.