CHANGE POINT DETECTION FOR HIGH-DIMENSIONAL LINEAR REGRESSION AND ITS APPLICATIONS FOR COVARIANCE MATRICES

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We pursue the goal of high-dimensional (inverse) covariance matrix estimation for data with abrupt structural changes. We try to detect these changes and potentially estimate the (inverse) covariance matrices in the resulting segments. Our approach is based on node-wise regression and for each regression we use the Lasso based proposal of Leonardi and Bühlmann [1] for change point detection in the case of high-dimensional linear regression. For this Lasso based estimator, we provide theoretical results corresponding to our more general setup, where not only the regression coefficients but also the covariance matrix of the predictors is allowed to change. We also propose a Graphical Lasso based estimator instead of the node-wise Lasso based approach and compare them in terms of accuracy in simulations, computational, as well as other aspects. Finally, we illustrate the developed methodology on a real-life example of stock returns.

References