

Joint estimation of the conditional mean and the conditional variance in a high-dimensional (auto-) regression

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Abstract

Sparse estimation methods based on ℓ_1 relaxation, such as the Lasso and the Dantzig selector, require the knowledge of the variance of the noise in order to properly tune the regularization parameter. This constitutes a major obstacle in applying these methods in several frameworks—such as time series, random fields, inverse problems—for which noise is rarely homoscedastic and the noise level is hard to know in advance. In this talk, we will present a new approach to the joint estimation of the conditional mean and the conditional variance in a high-dimensional (auto-) regression setting in a group-sparsity scenario. An attractive feature of the proposed estimator is that it is efficiently computable even for very large scale problems by solving a second-order cone program (SOCP). We will present theoretical and numerical results assessing the performance of the proposed procedure.