CrossMark

Asymptotic theory of the adaptive Sparse Group Lasso

Benjamin Poignard[1]

Abstract
We study the asymptotic properties of a new version of the Sparse Group Lasso estimator (SGL), called adaptive SGL. This new version includes two distinct regularization parameters, one for the Lasso penalty and one for the Group Lasso penalty, and we consider the adaptive version of this regularization, where both penalties are weighted by preliminary random coefficients. The asymptotic properties are established in a general framework, where the data are dependent and the loss function is convex. We prove that this estimator satisfies the oracle property: the sparsity-based estimator recovers the true underlying sparse model and is asymptotically normally distributed. We also study its asymptotic properties in a double-asymptotic framework, where the number of parameters diverges with the sample size. We show by simulations and on real data that the adaptive SGL outperforms other oracle-like methods in terms of estimation precision and variable selection.

Keywords Asymptotic normality · Consistency · Oracle property

✉   Benjamin Poignard
    poignard@sigmath.es.osaka-u.ac.jp

[1]   Graduate School of Engineering Science, Osaka University, 1-3 Machikaneyama, Toyonaka, Osaka 560-8531, Japan