"Asymptotic Theory of the Sparse Group LASSO"

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Abstract

This paper proposes a general framework for penalized convex empirical criteria and a new version of the Sparse-Group LASSO (SGL, Simon and al., 2013), called the adaptive SGL, where both penalties of the SGL are weighted by preliminary random coefficients. We explore extensively its asymptotic properties and prove that this estimator satisfies the so-called oracle property (Fan and Li, 2001), that is the sparsity based estimator recovers the true underlying sparse model and is asymptotically normally distributed. Then we study its asymptotic properties in a double-asymptotic framework, where the number of parameters diverges with the sample size. We show by simulations that the adaptive SGL outperforms other oracle-like methods in terms of estimation precision and variable selection.