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Title:

Estimating the Lasso's Effective Noise

ABSTRACT

Much of the theory for the lasso in the linear model $\mathbf{Y} = \mathbf{X}\beta^* + \varepsilon$ hinges on the quantity $2\|\mathbf{X}^\top \varepsilon\|_\infty / n$, which we call the lasso's effective noise. Among other things, the effective noise plays an important role in finite-sample bounds for the lasso, the calibration of the lasso's tuning parameter, and inference on the parameter vector β^* . In this paper, we develop a bootstrap-based estimator of the quantiles of the effective noise. The estimator is fully data-driven, that is, does not require any additional tuning parameters. We equip our estimator with finite-sample guarantees and apply it to tuning parameter calibration for the lasso and to high-dimensional inference on the parameter vector β^* .