Model Selection Consistency of Cp-LASSO in Linear Regression with Orthonormal Predictors

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Abstract

Model selection coupled with regularization is a commonly used method for model fitting to achieve sparsity or parsimony of resulting model. We study the typical configuration of a Cp plot with the Lasso when the number of orthogonal predictors in the regression is large and the nonzero coefficient of predictors is small. As suggested in the analysis, the forward predictor selection process should stop at the first local minimum of Cp-Lasso. The over fitting with the first local minimum of Cp-Lasso is mild when the minimum magnitude of nonzero coefficients of predictors is large.