Testing of covariate effects under ridge regression for high-dimensional data

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Abstract: In this paper, we revisit the ridge estimation in high-dimensional regression models. We propose a novel estimator of the error's variance and give its asymptotic result based on the random matrix theories as the dimension of covariates diverges with the sample size. {This estimator is promising compared with its competitors including the refitted cross validation method in many scenarios. Meanwhile, an upper bound of mean squared error is given for the ridge estimator of regression coefficients, and an efficient method is proposed on testing the high-dimensional covariate effects.

The proposal is valid under both low- and high-dimensional models, which performs well not only for the sparse alternatives but also for the non-sparse ones. Numerical examples are used to assess the finite-sample performance of the proposed method.