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Testing covariates in high-dimensional regression

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Abstract In a high-dimensional linear regression model, we propose a new procedure for testing statistical significance of a subset of regression coefficients. Specifically, we employ the partial covariances between the response variable and the tested covariates to obtain a test statistic. The resulting test is applicable even if the predictor dimension is much larger than the sample size. Under the null hypothesis, together with boundedness and moment conditions on the predictors, we show that the proposed test statistic is asymptotically standard normal, which is further supported by Monte Carlo experiments. A similar test can be extended to generalized linear models. The practical usefulness of the test is illustrated via an empirical example on paid search advertising.

Keywords Generalized linear model · High-dimensional data · Hypotheses testing · Paid search advertising · Partial covariance · Partial F-test