



# A two-stage sequential conditional selection approach to sparse high-dimensional multivariate regression models

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## Abstract

In this article, we deal with sparse high-dimensional multivariate regression models. The models distinguish themselves from ordinary multivariate regression models in two aspects: (1) the dimension of the response vector and the number of covariates diverge to infinity; (2) the nonzero entries of the coefficient matrix and the precision matrix are sparse. We develop a two-stage sequential conditional selection (TSCS) approach to the identification and estimation of the nonzeros of the coefficient matrix and the precision matrix. It is established that the TSCS is selection consistent for the identification of the nonzeros of both the coefficient matrix and the precision matrix. Simulation studies are carried out to compare TSCS with the existing state-of-the-art methods, which demonstrates that the TSCS approach outperforms the existing methods. As an illustration, the TSCS approach is also applied to a real dataset.

**Keywords** Conditional models · Multivariate regression · Precision matrix · Selection consistency · Sequential procedure · Sparse high-dimensional model

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