

Hypothesis Testing for Block-structured Correlation for High Dimensional Variables

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Abstract

Testing the independence or block independence of high-dimensional random vectors is important in multivariate statistical analysis. Recent works on high-dimensional block-independence tests aim to extend their validity beyond specific distributions (e.g., Gaussian) or restrictive block sizes. In this paper, we propose a new and powerful test for the block-structured correlation of high-dimensional random vectors, for sparse or nonsparse alternatives, without strict distributional assumptions. The statistical properties of the proposed test are developed under the asymptotic regime that the dimension grows proportionally with the sample size. Empirically, we find that the proposed test outperforms existing tests for a variety of alternatives, and works quite well when there are few existing tests at our disposal.

Keywords: High-dimension, Multivariate statistical analysis, Nonsparse alternatives, Sparse alternatives, Testing block-independence.