

Detection of correlations

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We consider the hypothesis testing problem of deciding whether an observed high-dimensional vector has independent normal components or, alternatively, if it has a small subset of correlated components. The correlated components may have a certain combinatorial structure known to the statistician. We establish upper and lower bounds for the worst-case (minimax) risk in terms of the size of the correlated subset, the level of correlation, and the structure of the class of possibly correlated sets. We show that some simple tests have near-optimal performance in many cases, while the generalized likelihood ratio test is suboptimal in some important cases.

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