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Generalized Schott type tests for complete independence in high dimensions. (English)  
Zbl 1465.62103  

Summary: In the high dimensional setting, this article explores the problem of testing the complete independence of random variables having a multivariate normal distribution. A natural high-dimensional extension of the test in [J. R. Schott, Biometrika 92, No. 4, 951–956 (2005; Zbl 1151.62327)] is proposed for this purpose. The newly defined tests are asymptotically distribution-free as both the sample size and the number of variables go to infinity and hence have well-known critical values, accommodate situations where the number of variables is not small relative to the sample size and are applicable without specifying an explicit relationship between the number of variables and the sample size. In practice, as the true alternative hypothesis is unknown, it is unclear how to choose a powerful test. For this, we further propose an adaptive test that maintains high power across a wide range of situations. An extensive simulation study shows that the newly proposed tests are comparable to, and in many cases more powerful than, existing tests currently in the literature.

MSC:
62H15 Hypothesis testing in multivariate analysis  
62H10 Multivariate distribution of statistics  
62E20 Asymptotic distribution theory in statistics

Keywords:  
high-dimensional data; hypothesis testing; independence of random variables; large m small n

Full Text: DOI

References:
[15] Jiang, T. F.; Yang, F., Central limit theorems for classical likelihood ratio tests for high-dimensional normal distributions,