Tests for Assessing Multivariate Normality

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Abstract

The assumption of the multivariate normality is common when analyzing multivariate data. But it is rarely verified, in part, because of the lack of simple and easy testing procedures to detect such violations. A test proposed by Malkovich and Afifi (1973) referred as the MA test generalizes the W statistic proposed by Shapiro and Wilk (1658) to test the multivariate normality by using the union intersection pricnciple (UIP). Under UIP, the MA test is the minimum of the W statistic over a set of orthonormal vectors. The genuine minimum is hard to find. By implementing the least square approximation, Malkovich and Afifi obtain a possible solution for the MA test. However, the least square approximation would depend upon the sample size and the dimensionality of the data. This paper intends to propose another algorithm, which is closer to the exact minimum. Due to the complexity of the W statistic, the exact or asymptotic distribution of the MA test is not available. Percentage points of the distribution of the test are evaluated through Monte Carlo simulations. The power of this test will be compared to that for the MA test.