Simulation study on improved Shapiro-Wilk test of normality

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Abstract

The W statistic proposed by Shapiro and Wilk ([2]) is frequently used for testing of the univariate and multivariate normality. However, the table of coefficients in the W statistic, its critical values and also constants in Johnson's S_B transformation to normal distribution ([3]), are not correct. Royston ([1]) gave an approximation for coefficients in the W statistic and use them to evaluate proper critical values of the Shapiro-Wilk test. In the paper, we determine new constants for the W statistic and Johnson's S_B transformation. Empirical significant levels of the improved Shapiro-Wilk test and the power against chosen alternatives are evaluated via simulation study.

Keywords

Multivariate normality, Empirical significant level, Power of the test.

References

[1] Royston, P. (1992). Approximating the Shapiro-Wilk W-test for non-normality. *Stat. Comput. 2*, 117–119.

[2] Shapiro, S.S. and M.B. Wilk (1965). An analysis of variance test for normality (complete samples). *Biometrika 52*, 591–611.

[3] Shapiro, S.S. and M.B. Wilk (1968). Approximations for the null distribution of the W statistic. *Technometrics 10*, 861–866.