

Combining goodness of fit tests for multivariate normality

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Abstract: Multivariate statistical analyses often require the data to come from multivariate normal distribution. Vector-valued tests for multivariate normality were introduced in [1]. The authors proposed two-dimensional procedures by combining several scalar tests such as non-parametric, Wald's type chi-squared tests [2] and Henze-Zirkler test. Two types of rejection regions, intersection and union, were considered there. Their preliminary simulation study to compare powers of the tests was limited to the multivariate t distribution with 10 degrees of freedom as an alternative and rejection regions with equal weights for the marginal significance levels. In this work we investigate the power of the vector-valued tests as a function of the weight w for the rejection regions of intersection type. Scalar tests of different origins are combined to form two-dimensional vector-valued tests. Moreover, vector-valued tests based on Neyman-Pearson intervals are developed and their performance is investigated through simulation study. This study assesses power of the proposed testing procedures implemented in a contributed package `mvnTest` [3] for the statistic software R [4].

Keywords: vector-valued goodness of fit tests, multivariate normality, modified chi-square type tests

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