Testing circular symmetry of a covariance matrix – the exact and near-exact distributions for the likelihood ratio test statistic

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Abstract

In this paper the exact distribution of the logarithm of the likelihood ratio test statistic for testing circular symmetry is obtained, for an odd number of variables p, under the form of a Generalized Integer Gamma distribution and for an even p, under the form of an infinite mixture of Generalized Integer Gamma distributions. For the case of an even p near-exact distributions are developed for the likelihood ratio test statistic which correspond to Generalized Near-Integer Gamma distributions or mixtures of these distributions. Numerical studies are conducted in order to assess the quality of these new approximations. Tables of exact quantiles, for odd p, and near-exact quantiles, for even p, as well as plots of the probability density functions and cumulative distributions functions for the likelihood ratio test statistic are presented.

Keywords

Near-exact distributions, Asymptotic distributions, Circular symmetry, Generalized Integer Gamma distribution, Generalized Near-Integer Gamma distribution, Mixtures.

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