Discrepancy measures between structured covariance matrices

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Abstract

In the literature various tests for covariance structures have been proposed, however, the method of measuring discrepancy between two distributions which differ in covariance matrix structures related to the study of power of the test remains an open problem. The aim of this paper is to verify the properties of the power of the test due to various discrepancy measures: simple one parameter discrepancies or more complex discrepancies based on minimization of Frobenius norm or entropy/quadratic loss functions. The criterion of the choice of the most suitable measure of discrepancy is based on increasing property of power function with respect to discrepancy.

In the paper the power of likelihood ratio and Rao score tests are considered, and the basic hypothesis is related to separable structure of the observation matrix under doubly multivariate model, however, presented results can be also applied to more general or more detailed covariance structures.

Keywords

covariance structures, power of the test, Frobenius norm, entropy loss function, quadratic loss function, likelihood ratio test, Rao score test.