Testing elaborated block-structures in covariance matrices by splitting the null hypothesis - an overview

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The analysis of the covariance structure is a key topic in many sub-fields of Statistics. Due to the complicated structure of the exact distributions of the test statistics involved, the required tests are often not performed or rather are performed using approximations for the distributions of the test statistics which, in most of the cases, are unable to guarantee the necessary accuracy of the results. These problems become even more evident and serious when one intends to perform tests of elaborated structures. In this work we intend to give an overview of the latest results on this topic and in particular we aim to clarify and illustrate the two following points: i) how it is possible to create a procedure to test elaborated block-structures in covariance matrices by splitting the null hypothesis into a set of conditionally independent hypotheses; ii) how does the proposed procedure make it easy the development of very precise near-exact approximations which allow the easy implementation and execution of the different tests. Several examples of elaborated structures are presented. The numerical studies carried out illustrate the quality of the near-exact approximations developed.

Keywords: covariance structure; hypothesis testing; likelihood ratio tests; near-exact distributions.