One-way MANOVA with block compound-symmetric covariance matrices with block-circular diagonal blocks

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Abstract

Although the likelihood ratio test for equality of mean vectors or one-way MANOVA with unstructured covariance matrices is a well-known test, likelihood ratio tests for one-way MANOVA when the covariance matrices exhibit some structure, namely a block structure, only recently have been developed. Although in these cases one may still use the test for unstructured covariance matrices, in doing so one is not taking advantage of the structure of the covariance matrices and is as such using more degrees of freedom for the error than necessary, and as such, is also losing power. In this presentation it is shown how one can quite easily derive the likelihood ratio test statistic for the one-way MANOVA with block compound-symmetric covariance matrices with block-circular diagonal blocks, and how one can obtain its distribution. Furthermore, it is shown that in some circumstances this distribution, although seeming at first sight rather complicated, it may have a finite form representation. The test presented has as particular cases both the one-way MANOVA with block-circular or block compound-symmetric covariance matrices, and the one-way MANOVA with a doubly exchangeable covariance matrix, already derived before.

Keywords

One-way MANOVA, Covariance matrices, Block-circular diagonal blocks.