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12. Probability and Statistics

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Power and admissibility of spherical multivariate tests

In 1996, Läuter proposed a class of new exact level-α tests for multivariate, normally distributed data $\mathbf{X}$. These tests are alternatives to classical MANOVA tests (e. g. Hotelling's T^2). They overcome the limitations of the classical methods concerning sample size and dimension. Under certain conditions, spherical tests are much more powerful than their classical counterparts.
To construct a spherical test for a specific linear hypothesis, a coefficient vector $\mathbf{d}$ has to be defined as a function of a corresponding sums-of-products matrix $\mathbf{G}_{xx}$. It can be shown by a Bayesian approach that the largest eigenvector of $\mathbf{G}_{xx}\mathbf{d} = Diag\,(\mathbf{G}_{xx})\,\mathbf{d}\lambda$ provides an admissible test within this settting.

Reference: J. Läuter, E. Glimm, and S. Kropf (1997): Multivariate tests based on left-spherically distributed linear scores. Submitted to *The Annals of Statistics.*