

Multiple comparisons of several homoscedastic multivariate populations

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Abstract The limiting joint distribution of correlated Hotelling's T^2 statistics associated with multiple comparisons with a control in multivariate one-way layout model is a multivariate central nonsingular chi-square distribution with one-factorial correlation matrix, which has the distribution function expressed in a closed form as an integral of a product of noncentral chi-square distribution functions with respect to a central chi-square density function. For pairwise comparisons, it is a multivariate central singular chi-square distribution whose distribution function is generally intricate. To overcome the complexity of the (exact or asymptotic) distribution theory of T_{\max}^2 -type statistics appeared in simultaneous confidence intervals of mean vectors, improved Bonferroni-type inequalities are applied to construct asymptotically conservative simultaneous confidence intervals for pairwise comparisons as well as comparisons with a control.

Keywords Multiple comparisons · Bonferroni-type inequality · Maximum of correlated Hotelling's T^2 statistics · Multivariate central nonsingular or singular chi-square distribution