

Nonparametric multiple comparison procedures under heteroscedasticity

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We study simultaneous rank procedures for unbalanced designs with independent observations. The hypotheses are formulated in terms of purely nonparametric treatment effects. In this context, we derive rank-based multiple contrast test procedures and simultaneous confidence intervals which take the correlation between the test statistics into account. Hereby, the individual test decisions and the simultaneous confidence intervals are compatible. This means, whenever an individual hypothesis has been rejected by the multiple contrast test, the corresponding simultaneous confidence interval does not include the null, i.e. the hypothetical value of no treatment effect. The procedures allow for testing arbitrary purely nonparametric multiple linear hypotheses (e.g. many-to-one, all-pairs, changepoint, or even average comparisons). We do not assume homogeneous variances of the data; in particular, the distributions can have different shapes even under the null hypothesis. Thus, a solution to the multiple nonparametric Behrens-Fisher problem is presented in this unified framework.