

Parametric Simultaneous Inference Under Test

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Multiple testing problems occur in many areas of application. Hothorn, Bretz and Westfall (2008) introduced a framework for simultaneous inference in general parametric models, which allows for an arbitrary number of null hypotheses to be tested simultaneously with an overall type I error rate below the nominal level α . Each null hypothesis is specified by a linear combination of model parameters. The test procedure is based on the asymptotic or exact distribution of the linear functions set up in the hypotheses; a reference distribution which is obtained under little restrictive conditions. As normality and homoscedasticity are not assumed, the framework allows for simultaneous inference in various parametric models such as linear regression and ANOVA models, generalized linear models, Cox proportional hazard models, linear mixed effects models, and robust linear models. In ANOVA models, multiple comparisons can be considered not only of contrasts of means, but of arbitrary contrasts specified by a linear function of the model parameters.

In a simulation study the size and power properties of this test procedure were investigated in various parametric models (Herberich, 2009). Furthermore, the performance of a robust variant of simultaneous inference using sandwich estimators was investigated in ANOVA models with heterogeneous variances and compared to the properties of other post-hoc tests which assume homoscedasticity.

References

- Herberich, E. (2009). Niveau und Güte simultaner parametrischer Inferenzverfahren. Diploma Thesis, Ludwig-Maximilians-Universität München, Institut für Statistik.
- Hothorn, T., Bretz, F. and Westfall, P. (2008). Simultaneous Inference in General Parametric Models. *Biometrical Journal*, 50(3):346–363.