

APPLICATIONS OF ROBUST ANOVA METHODS

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The classical ANOVA method for comparing means loses its power when the assumptions of normality or heterogeneity between groups are violated. We compare several robust methods to test the mean equality in one-way ANOVA designs under the departure from standard assumptions.

One approach to deal with robust ANOVA is to use the empirical likelihood (EL) method [1]. Empirical likelihood is a powerful non-parametric statistical method that does not require assumptions about the underlying distribution. Tsao and Wu [2] demonstrated that EL-based ANOVA methods are superior to usual least squares ANOVA in the presence of variance heterogeneity. A version of EL ANOVA for the trimmed means was explored by Velina, Valeinis & Luta [3]. This method offers some advantage over EL ANOVA in outlier contaminated data situations.

Another approach to robustify ANOVA is to employ the relationship between ANOVA and linear regression. Bondell & Stefanski [4] proposed the linear regression estimators based on a two-stage generalized empirical likelihood method. It has good efficiency properties while being robust to outliers. We apply the Bondell & Stefanski method to the situation involving a categorical predictor and obtain a robust ANOVA version of the method.

We use the aforementioned methods to analyse simulated and real datasets, involving heterogeneous variances and/or non-normal data and compare the efficiency and robustness of the methods.

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