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Testing against ordered alternatives in one-way ANOVA model with exponential errors

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Abstract

In this paper, a one-way heteroscedastic ANOVA model is considered with exponentially distributed errors. The likelihood ratio test (LRT) and two multiple comparison tests are developed for testing against ordered alternatives. A parametric bootstrap (PB) approach is proposed for implementation of tests and its asymptotic accuracy is proved. An extensive simulation study shows that all the proposed tests are accurate in terms of achieving the nominal size value, even for small samples. The proposed simultaneous confidence intervals are also seen to maintain the preassigned coverage probability. The powers of these tests are compared with a recently proposed test, which is quite conservative. Finally, the proposed tests are illustrated with the help of three data sets related to medical studies. We have developed an 'R' package for implementing our test procedures and shared it on the open platform 'GitHub.'

Keywords Asymptotic accuracy · Likelihood ratio test · Multiple comparison tests · Parametric bootstrap

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