

Testing independence for the linear by linear association model using power-divergence test statistics

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Abstract

Linear by linear association model which is a special case of the loglinear models is used to model ordinal count data given in contingency tables. The mostly used test statistic for testing independence in this model is the well-known likelihood ratio test statistic. However, there are other goodness of fit statistics which may have better exact size properties. Cressie and Pardo (2000, 2002), Cressie et al. (2003), and Pardo and Pardo (2005) have considered the family of power-divergence test statistics to solve different problems related with loglinear models. In this study, these test statistics with the maximum likelihood estimator and different estimators have been considered to test independence for the linear by linear association model for two-way contingency tables having multinomial sampling. Total number of test statistics including the likelihood ratio statistic is 41. Their exact size properties for small and moderate samples have been compared via simulation under the assumption of no empty cells. 2x2, 2x3 and 3x3 tables have been considered to show the effect of increasing the number of cells to the exact sizes when the sample size held constant.

Keywords

Contingency table, Ordinal data, Power-Divergence Test Statistics.

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