A New Generalized Test Statistic for Multinomial Goodness-of-Fit

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Abstract: Several goodness-of-fit tests are proposed for testing the goodness-of-fit of discrete multivariate data. We propose a unified analysis of goodness-of-fit using a generalized test statistic(s). Depending on the choice of parameters, the generalized test statistics results into some of the known statistics such as Chi-square, and likelihood ratio generalized test, it has been observed that the proposed test statistic is highly robust against extreme values and does not assume the distribution of parent population. The asymptotic distribution of the proposed test statistic and the p-value function are discussed. The power comparisons have been made, and it is found that, the proposed statistic dominates over the Cressie and Read (1984) test statistic however the comparisons are made with respect to change in the location only. The application of proposed method has been attempted by using a real-life data, of Cranor and Christensen (2003).