SMOOTHING OF LIKELIHOOD RATIO STATISTIC FOR EQUIPROBABLE MULTINOMIAL GOODNESS-OF-FIT

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Abstract. The likelihood ratio chi-square criterion for testing goodness-of-fit in k cell multinomials is known to overestimate significance for small and moderate sample sizes (see, e.g., Larntz (1978)). Therefore, the usual chi-square approximation to the upper tail of the likelihood ratio statistic G^2, is not satisfactory. Several authors have derived adjustments (e.g., Williams (1976), Smith *et al.* (1981), Hosmane (1987*b*)), so that the asymptotic mean of G^2 matches the mean of the asymptotic chi-square distribution in the hope that the distribution of G^2 would improve. In this paper, a new adjustment to G^2 is determined on the basis of the n^{-1}-order term (n being the total number) of the Edgeworth expansion of the distribution of smoothed G^2. Monte Carlo results indicate that the modified G^2 outperforms the unadjusted G^2.