Estimating the number of zero-one multi-way tables via sequential importance sampling

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Abstract　In 2005, Chen et al. introduced a sequential importance sampling (SIS) procedure to analyze zero-one two-way tables with given fixed marginal sums (row and column sums) via the conditional Poisson (CP) distribution. They showed that compared with Monte Carlo Markov chain (MCMC)-based approaches, their importance sampling method is more efficient in terms of running time and also provides an easy and accurate estimate of the total number of contingency tables with fixed marginal sums. In this paper, we extend their result to zero-one multi-way (d-way, $d \geq 2$) contingency tables under the no d-way interaction model, i.e., with fixed $d-1$ marginal sums. Also, we show by simulations that the SIS procedure with CP distribution to estimate the number of zero-one three-way tables under the no three-way interaction model given marginal sums works very well even with some rejections. We also applied our method to Samson's monks data set.