

Fiducial Inference for Discrete Distributions: Binomial and Poisson Cases

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In this talk, we propose a simple method of constructing confidence intervals for a function of binomial success probabilities and for a function of Poisson means. The method involves finding an approximate *fiducial quantity* (FQ) for the parameters of interest. A FQ for a function of several parameters can be obtained by substitution. For the binomial case, the fiducial approach is illustrated for constructing confidence intervals for the relative risk and the ratio of odds. Fiducial inferential procedures are also provided for estimating functions of several Poisson parameters. In particular, fiducial inferential approach is illustrated for interval estimating the ratio of two Poisson means and for a weighted sum of several Poisson means. Simple approximations to the distributions of the FQs are also given for some problems. The merits of the procedures are evaluated by comparing them with those of existing asymptotic methods with respect to coverage probabilities, and in some cases, expected widths. Comparison studies indicate that the fiducial confidence intervals are very satisfactory, and they are comparable or better than some available asymptotic methods. The fiducial method is easy to use and is applicable to find confidence intervals for many commonly used summary indices. Some examples are used to illustrate and compare the results of fiducial approach with those of other available asymptotic methods.