Mathematics > Statistics Theory

The cost of using exact confidence intervals for a binomial proportion

Måns Thulin

(Submitted on 6 Mar 2013)

When computing a confidence interval for a binomial proportion p one must choose between using an exact interval, which has a coverage probability of at least 1-{\alpha} for all values of p, and a shorter approximate interval, which may have lower coverage for some p but that on average has coverage equal to 1-\alpha. We investigate the cost of using the exact one and two-sided Clopper--Pearson confidence intervals rather than shorter approximate intervals, first in terms of increased expected length and then in terms of the increase in sample size required to obtain a desired expected length. Using asymptotic expansions, we also give a closed-form formula for determining the sample size for the exact Clopper--Pearson methods. For two-sided intervals, our investigation reveals an interesting connection between the frequentist Clopper--Pearson interval and Bayesian intervals based on noninformative priors.

Subjects: **Statistics Theory (math.ST)**; Methodology (stat.ME)
Cite as: **arXiv:1303.1288 [math.ST]**
(or **arXiv:1303.1288v1 [math.ST]** for this version)

Submission history

From: Måns Thulin [view email]
[v1] Wed, 6 Mar 2013 10:00:25 GMT (61kb,D)

Which authors of this paper are endorsers?