

The APP for estimating population proportion based on skew normal approximations and the Beta-Bernoulli process

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Abstract

The a priori procedure (APP) is concerned with determining appropriate sample sizes to ensure that sample statistics to be obtained are likely to be good estimates of corresponding population parameters. Previous APP work pertaining to proportions has used the normal approximation to the binomial distribution, but this is problematic when the population proportion is near zero or one. The present contribution addresses the issue in four ways. First, we add a skew normal approximation that does a better job than the normal approximation. Second, we add a Bayesian component making use of a prior beta distribution that is conjugate to the binomial distribution. Third, we provide simulations and real data examples, one of them is a set of Covid-19 data. Finally, we include free and user-friendly computer programs to aid researchers in making the calculations.