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## Comparative Probability Metrics: Using Posterior Probabilities to Account for Practical Equivalence in A/B Tests

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Recently, online-controlled experiments (i.e., A/B tests) have become an extremely valuable tool used by internet and technology companies for purposes of advertising, product development, product improvement, customer acquisition, and customer retention to name a few. The data-driven decisions that result from these experiments have traditionally been informed by null hypothesis significance tests and analyses based on p-values. However, recently attention has been drawn to the shortcomings of hypothesis testing, and an emphasis has been placed on the development of new methodologies that overcome these shortcomings. We propose the use of posterior probabilities to facilitate comparisons that account for practical equivalence and that quantify the likelihood that a result is practically meaningful, as opposed to statistically significant. We call these posterior probabilities comparative probability metrics (CPMs). This Bayesian methodology provides a flexible and intuitive means of making meaningful comparisons by directly calculating, for example, the probability that two groups are practically equivalent, or the probability that one group is practically superior to another. In this talk, we will describe a unified framework for constructing and estimating such probabilities, and we will illustrate a sample size determination methodology that may be used to determine how much data are required to calculate trustworthy CPMs.

### Keywords

Bayesian Inference; Design and Analysis of Experiments; Practical Equivalence

### Classification

Both methodology and application

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