Bias in Relative Accuracy Metrics

Robin Cantor[1], Philip Cross[1], Edmund Lau[2], and Jordana Schmier[1]

[1]Exponent Inc.
1800 Diagonal Road, Suite 500
Alexandria, VA 22314

[2]Exponent Inc.
149 Commonwealth Drive
Menlo Park, CA 94025

Corresponding author's Email: jschmier@exponent.com

Abstract: The comparison of two sources of measured values is, at first glance, an easy undertaking. Many studies use a percent difference metric to reflect the relative accuracy of the compared sources. However, it can become more difficult to calculate the percent difference when one of those sources may be considered a reference standard, or when both sources are associated with some degree of uncertainty. Multiple metrics can be used depending on the situation. This paper compares findings of three metrics to evaluate the percent difference between two sources of values. All three use the difference between matched pairs as the numerator, but different denominators: the tested value, the gold standard, and the average of the two. Through real-world application and simulations, we explore the amount of bias introduced by each metric in situations with small differences and large differences, and how the influence of outliers varies with each metric.

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