How do my distributions differ? Significance testing for the Overlapping Index using Permutation Test

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Abstract

The present study introduces the application of the permutation test to the Overlapping Index, an effect size measure for comparing density distributions of groups or conditions, to estimate effects of interest in psychological science. Starting with common scenarios in psychological science research, the paper highlights the importance of relying on statistical methods that are resilient to the complexities inherent in psychological data, where assumption violations are often inevitable. A Simulation study is presented to illustrate the practical implications and reliability of the proposed test compared to commonly used alternatives. The findings demonstrate the good control of Type I error of the ζ-Overlapping test and how this approach outperforms in terms of power all other tests considered in the simulation, already with small samples. The paper offers practical guidance and demonstrates the advantages of this method, emphasizing its potential to enhance transparency and rigor in psychological data analysis by shifting focus from traditional significance testing to comprehensive distributional evaluations.

Keywords: simulation, data visualization, type I error, power