

A Nonparametric Test for the Umbrella Alternative Based on the Sum of Spearman Correlation Coefficients

Chia-Hao Chang and Ching-Ho Yen

Chang Gung University of Science and Technology and Huafan University

Abstract

The Mack-Wolfe test is the most common nonparametric test used for testing whether k location parameters are equal or if they follow an umbrella pattern. This paper develops a nonparametric test to test the same set of hypotheses based on the Spearman correlation coefficient. A Monte-Carlo simulation study is conducted to compare the estimated powers of the proposed test with the Mack-Wolfe test, as well as the Alvo test for 3, 4 and 5 populations. The study finds that when larger sample sizes are associated with smaller jumps, the proposed test has higher power than the Mack-Wolfe and Alvo tests.

Keywords: U -statistics, nonparametric test, rank, Spearman rho, umbrella alternatives, Mack-Wolfe test, Alvo test.