A rank-based high-dimensional test for equality of mean vectors.

Summary: The Wilcoxon signed-rank test and the Wilcoxon-Mann-Whitney test are two commonly used rank-based methods for one- and two-sample tests when the one-dimensional data are not normally distributed. The new rank-based nonparametric tests for equality of mean vectors are proposed in the high-dimensional settings. To overcome the technical challenges in data sorting, the new statistics are constructed by taking the sum of the Wilcoxon signed-rank or Wilcoxon-Mann-Whitney test statistics from each dimension of the data. The asymptotic properties of the proposed test statistics are investigated under the null and local alternative hypotheses. Simulation studies show that the new tests perform as well as the state-of-the-art methods when the high-dimensional data are normally distributed, but they turn out to be more powerful when the normality assumption is violated. Finally, the new testing methods are also applied to a human peripheral blood mononuclear cells gene expression data set for demonstrating their usefulness in practice.

MSC:

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Keywords:

equality of means; high-dimensional data; Wilcoxon signed-rank test; Wilcoxon-Mann-Whitney test

References:


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