Package ‘mcBFtest’

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Type Package
Title Monte Carlo Based Tests for the Behrens Fisher Problem as an
   Alternative to Welch’s t-Approximation
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Imports stats, MASS
Description Monte Carlo based tests for the Behrens Fisher Problem enhance the statistical power
   and performs better than Welch’s t-approximation, see Ullah et al. (2019).
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Description

Internal functions not to be used by the user.
Description

In the t test, it is usually the case that the assumption of equal variances on the two groups is violated. The test problem is known as the Behrens-Fisher (BF) problem when no assumption of equal population variances can be made. For the BF problem, the T statistic provides value for a given dataset and its statistical distribution is not easy to characterise.

To our knowledge, the best approximation thus far is due to Welch (1938). The Welch’s test involves two layers of approximations: approximating the distribution of the statistic by a t-distribution, which in turn depends on an approximate degrees of freedom.

The Monte Carlo based tests improve upon Welch’s approximate test by avoiding one layer of approximation, resulting in enhancement in statistical power than Welch’s t-approximation.

Usage

mcBFtest(x, y, method, MC)

Arguments

- **x**: a (non-empty) numeric vector of data values
- **y**: a (non-empty) numeric vector of data values
- **method**: if "t" is used, we will use t-test assuming equal variance and df=n+m-2. If "W" is used, we assume unequal variance and the Welch approximation is used. If "Monte Carlo", the Monte Carlo procedure is applied.
- **MC**: a number for Monte Carlo procedure

Value

The function returns a list including

- **p.value**: the p-value for the test.

Author(s)

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References

See Also
t.test function from package stats

Examples

library(mcbFtest)
x <- sleep[1:10,1]
y <- sleep[11:20,1]
mcbFtest(x, y, method = "t")
mcbFtest(x, y, method = "W")
mcbFtest(x, y, method = "Monte Carlo", MC = 100000)
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