Package ‘tsc’

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Type Package

Title Exact Parametric and Nonparametric Likelihood Ratio Tests for Two-Sample Comparisons

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Description This package performs exact parametric/nonparametric likelihood ratio tests for two-sample comparison

License GPL(>= 2)

LazyData yes

Archs i386, x64

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Description

Stores cutoff information for different target alpha values and various sets of data of varying sample size.

Format
data.frame with columns equal to sample size information and rows equal to different target alpha values.
Details

This file contains cutoff information for different target alpha values and various sets of data of varying sample size. This table is generated for sample sizes 2-30, 35, 40, 45, 50, 55, 60, 70, 80, 90, 100, 120, 150, 170, 200, 225, 250, 275, 300, 325, 350, 375, 400, 425, 450. The target alphas range from .1 to .9 in increments of .1. The delta is 0.1

Note

This dataset is used within the tsc.test function. There is no need for the user to ever call this dataset.

tsc.test

Exact Parametric and Nonparametric Likelihood Ratio Tests for Two-Sample Comparisons

Description

This function performs exact parametric/nonparametric likelihood ratio tests for two-sample comparisons.

Usage

```
tsc.test(x, y, method=“DBEL”, t_m=2, mc=3000)
```

Arguments

- `x`: numeric vector of data for x (missing values are not allowed).
- `y`: numeric vector of data for y (missing values are not allowed).
- `method`: a character string specifying the method for obtaining the test statistic and corresponding p-value. It must be one of "TAS", "TAS&SW" or "DBEL" (default). "TAS" indicates using the exact likelihood ratio test (LRT) proposed in [4]; "TAS&SW" indicates using the combined test based on the LRT and the Shapiro-Wilk test via the Bonferroni correction technique; "DBEL" indicates using the density-based empirical likelihood (DBEL) ratio test. Similar to the DBEL ratio test procedures can be found in [1], [2], [3].
- `t_m`: indicates a method for obtaining the p-value when the "DBEL" method is used. It must have values 1, 2 (default), 3, where t_m=1 corresponds to the traditional Monte Carlo method; t_m=2 corresponds to the interpolation method based on regression techniques and tabulated critical values, this method is similar to that described in [2]; t_m=3 corresponds to a Bayesian type method that combines the method t_m=1 and t_m=2 in a manner similar to that proposed in [5].
- `mc`: number of monte carlo simulations used to obtain p-value when method="DBEL" and t_m=1 (mc=3000 is default).

Details

The function performs the two-sample comparison using exact procedures: for the LRT to test $H_0$: $X\sim N$, $Y\sim N$, $E(X)=E(Y)$, $\text{Var}(X)=\text{Var}(Y)$ vs. $H_1$: $X\sim N$, $Y\sim N$, $E(X)$ is not = $E(Y)$, $\text{Var}(X)$ is not = $\text{Var}(Y)$; for the LRT combined with the S-W test to test $H_0$: $X\sim N$, $Y\sim N$, $E(X)=E(Y)$, $\text{Var}(X)=\text{Var}(Y)$ vs. $H_1$: $X, Y$ do not follow normal distributions, $E(X)$ is not = $E(Y)$, $\text{Var}(X)$ is not = $\text{Var}(Y)$; for the DBEL ratio test to test $H_0$: $X\sim N$, $Y\sim N$, $E(X)=E(Y)$, $\text{Var}(X)=\text{Var}(Y)$ vs. $H_1$: $X, Y$ do not follow normal distributions, $E(X)$ is not = $E(Y)$, $\text{Var}(X)$ is not = $\text{Var}(Y)$. (Here $X\sim N$ means $X$ distributed following a normal distribution.)
tsc.test

Value

Returns a vector of length 2 with a value of the test statistic and the corresponding p-value.

\[
\begin{align*}
\text{test_stat} & \quad \text{the value of the test statistic} \\
\text{p_value} & \quad \text{the p-value for the test}
\end{align*}
\]

Author(s)

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References


Examples

```r
#Ex.1
x <- rnorm(57, 0, 1)
y <- rnorm(67, 0, 1)
# two-sample comparisons test for whether x and y are from normal distributions,
# and whether the mean of x is the equal to the mean of y,
# and whether the variance of x is the equal to the variance of y.
# method in [4] is used to obtain the test statistic and corresponding p-value.
test_lrt <- tsc.test(x, y, method = "TAS")
# combined method based on LRT and S-W via the Bonferroni technique
# is used to obtain the p-value.
test_comb <- tsc.test(x, y, method = "TAS&SW")
# DBEL method is used to obtain the test statistics.
# Monte carlo method is used to obtain the p-value with 10000 monte carlo simulations.
test_dbel1 <- tsc.test(x, y, method = "DBEL", t_m = 1, mc = 1000)
# DBEL method is used to obtain the test statistic.
# The interpolation method based on the regression technique and tabulated critical values
# is used to obtain the p-value.
test_dbel2 <- tsc.test(x, y, method = "DBEL", t_m = 2)
# DBEL method is used to obtain the test statistic.
# The Bayesian method is used to obtain the p-value.
test_dbel3 <- tsc.test(x, y, method = "DBEL", t_m = 3)

# Ex.2
A <- rnorm(15, 0, 1)
B <- runif(31, -1, 1)
```
test_lrt1 <- tsc.test(A, B, method = "TAS") # p-value is 0.3656844.
test_comb1 <- tsc.test(A, B, method = "TAS&SW") # p-value is 0.02588757.
test_dbel1 <- tsc.test(A, B, method = "DBEL", t_m = 1, mc = 1000) # p-value is 0.001.
test_dbel5 <- tsc.test(A, B, method = "DBEL", t_m = 2) # p-value is 0.001774751.
test_dbel6 <- tsc.test(A, B, method = "DBEL", t_m = 3) # p-value is 0.00812455.

# B is not from the normal distribution, so the null hypothesis should be rejected.
# The LRT method does not reject H_0, since this methods work just for X~N and Y~N.
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