Package ‘StepwiseTest’

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Type Package

Title Multiple Testing Method to Control Generalized Family-Wise Error Rate and False Discovery Proportion

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Author Yu-Chin Hsu and Kendro Vincent

Maintainer Kendro Vincent <vincent.kendro@gmail.com>

Description Collection of stepwise procedures to conduct multiple hypotheses testing. The details of the stepwise algorithm can be found in Romano and Wolf (2007) <DOI:10.1214/009053606000001622> and Hsu, Kuan, and Yen (2014) <DOI:10.1093/jjfinec/nbu014>.

License GPL (>= 2)

Imports Rcpp (>= 0.12.2)

Suggests foreach, tseries

LinkingTo Rcpp, RcppArmadillo

NeedsCompilation yes

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Description

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Usage

FWERkControl(test_stat, boot_stat, k, alpha)
FDPControl(test_stat, boot_stat, gamma, alpha)

Arguments

test_stat  m x 1 column vector of test statistics
boot_stat  m x B matrix of bootstrap statistics
k  Number of false rejections
gamma  False discovery proportion
alpha  The desired FWER(k) or FDP level

Value

Reject: A 0/1 numeric vector where the element \( j \) equals 1 indicates the model \( j \) is significant.
CV: The critical value.

Author(s)

Yu-Chin Hsu and Kendro Vincent
Maintainer: Kendro Vincent <vincent.kendro@gmail.com>

References

Examples

```r
# Specify the model parameters
m_null = 3
m_alt = 7
m = m_null + m_alt
mu = c(rep(0, m_null), rep(0.5, m_alt))
rho = 0.25
omega = (1-rho)*diag(1, m) + rho*matrix(1, m, m)

# generate the data
n = 100
y = mu %*% matrix(1, 1, n) + v %*% matrix(rnorm(m*n), m, n)

# calculate the test statistics and bootstrap statistics
library(foreach)
library(tseries)
B = 100
y_mean = apply(y, 1, mean)
y_sig = apply(y, 1, sd)
t_stat = as.matrix(sqrt(n)*y_mean/y_sig)
s = tsbootstrap(1:n, B, b=2, type="stationary")
b_stat = foreach(i=1:B, .combine=cbind) %do% {
  y_boot = y[, s[, i]]
  y_mean_boot = apply(y_boot, 1, mean)
  sqrt(n)*(y_mean_boot - y_mean)/y_sig
}

# Multiple test that controls FWER(1) at 5% significance level
FWERControl(t_stat, b_stat, 1, 0.05)

# Multiple test that controls FWER(3) at 5% significance level
FWERControl(t_stat, b_stat, 1, 0.05)

# Multiple test that controls FDP(0.1) at 5% significance level
FDPControl(t_stat, b_stat, 0.1, 0.05)
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