Package 'JUMP'

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Type Package

Title Replicability Analysis of High-Throughput Experiments

Version 1.0.2

Description Implementing a computationally scalable false discovery rate control procedure for replicability analysis based on maximum of p-values. Please cite the manuscript corresponding to this package [Lyu, P. et al., (2023), <doi:10.1093/bioinformatics/btad366>].

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Depends R (>= 4.1.2), Rcpp, splines, stats

LinkingTo Rcpp, RcppArmadillo

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NeedsCompilation yes

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Contents

`JUMP` *Replicability Analysis of High-Throughput Experiments*

Description

Replicability Analysis of High-Throughput Experiments

Usage

```
JUMP(pvals1, pvals2, alpha = 0.05, lambda = seq(0.01, 0.8, 0.01))
```

Arguments

`pvals1`	A numeric vector of p-values from study 1.
`pvals2`	A numeric vector of p-values from study 2.
`alpha`	The FDR level to control, default is 0.05.
`lambda`	The values of the tuning parameter to estimate pi_0. Must be in [0,1), default is seq(0.01, 0.8, 0.01).

Value

a list with the following elements:

`p.max`	The maximum of p-values across two studies.
`jump.thr`	The estimated threshold of p.max to control FDR at level alpha.

Examples

```
# Simulate p-values in two studies
m = 10000
h = sample(0:3, m, replace = TRUE, prob = c(0.9, 0.025, 0.025, 0.05))
states1 = rep(0, m); states2 = rep(0, m)
states1[which(h==2|h==3)] = 1; states2[which(h==1|h==3)] = 1
z1 = rnorm(m, states1*2, 1)
z2 = rnorm(m, states2*3, 1)
p1 = 1 - pnorm(z1); p2 = 1 - pnorm(z2)
# Run JUMP to identify replicable signals
res.jump = JUMP(p1, p2, alpha = 0.05)
sig.idx = which(res.jump$p.max <= res.jump$jump.thr)
```

`jump_cutoff` *Estimate threshold of maximum p-values across two studies to control FDR.*

Description

Estimate threshold of maximum p-values across two studies to control FDR.

Usage

```
jump_cutoff(pa_in, pb_in, xi_in, alpha_in)
```

Arguments

`pa_in`	A numeric vector of p-values from study 1.
`pb_in`	A numeric vector of p-values from study 2.
`xi_in`	The estimates of proportions of three null components.
`alpha_in`	The FDR level to control, default is 0.05.

Value

A list including the maximum of p-values and estimated threshold for FDR control.

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