Package 'rbsrp'

April 1, 2024

Type Package

Title Random Projection-Based Response Best-Subset Selector

Version 0.0.1

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Description Provide a procedure to select response variables for ultrahigh dimensional multi-outcome data, where both the dimensions of response and predictor outcomes are substantially greater than the sample size. It also provides the multi test procedure including Benjamini Hochberg and Bonferroni correction.

License GPL (>= 2)

Depends R (>= 3.5.0)

Imports stats, MASS, Matrix

LazyData true

Repository github

URL https://github.com/xliusufe/rbsrp

Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.2.2

R topics documented:

bh *Benjamini–Hochberg procedure and Benjamini–Yekutieli procedure*

Description

Benjamini–Hochberg procedure for controlling the false discovery rate and Benjamini–Yekutieli procedure for controlling the false discovery rate under dependency.

Usage

```
bh(Y, X, alpha)
```

Arguments

Y	A $n \times q$ Response matrix.
X	A $n \times p$ Numeric design matrix for the model.
alpha	The significant level. Default is alpha = 0.05.

Value

A list

- bestset - The selected subscript position of the response best subset.

References

Benjamini, Y. and Hochberg, Y. (1995). Controlling the false discovery rate a practical and powerfulapproach to multiple testing. Journal of the Royal Statistical Society Series B, 57, 289–300.

Benjamini, Y. and Yekutieli, D. (2001). The control of the false discovery rate in multiple testing under dependency. The Annals of Statistics, 29, 1165–1188.

Examples

```
library("stats")
library("MASS")
library("Matrix")
n   <- 200
p   <- 5
q   <- 10
q0  <- 5
beta <- matrix(runif(p*q0),p,q0)
eps <- matrix(rnorm(n*q),n,q)
x <- matrix(rnorm(n*p),n,p)
y <- cbind(x%*%beta, matrix(0,n,q-q0)) + eps
fit <- bh(y,x,alpha=0.05)
fit$bestset

data(simulatedData)
y = simulatedData$Y
w = simulatedData$W
fit <- bh(y,w,alpha=0.05)
fit$bestset
```

bonf *Bonferroni test*

Description

Bonferroni correction test.

Usage

```
bonf(Y, X, alpha)
```

Arguments

Y	A $n \times q$ Response matrix.
X	A $n \times p$ Numeric design matrix for the model.
alpha	The significant level. Default is alpha = 0.05.

Value

A list

- decision.set - The estimation of the δ.
- bestset - The selected subscript position of the response best subset.

References

Liu, X., Hu, J., and Liu, X. (2024). Random Projection-Based Response Best-Subset Selector for Ultrahigh Dimensional Multi-Outcome Data. Manuscript.

Examples

```
library("stats")
library("MASS")
library("Matrix")
n   <- 200
p   <- 5
q   <- 10
q0  <- 5
beta <- matrix(runif(p*q0),p,q0)
eps <- matrix(rnorm(n*q),n,q)
x <- matrix(rnorm(n*p),n,p)
y <- cbind(x%*%beta, matrix(0,n,q-q0)) + eps
fit <- bonf(y,x,alpha=0.05)
fit$bestdecision
fit$bestset

data(simulatedData)
y = simulatedData$Y
w = simulatedData$W
fit <- bonf(y,w,alpha=0.05)
```

datas *Simulated dataset and a real dataset.*

Description

Simulated data from a high-dimensional multivariate linear model and a real breast cancer data.

Usage

```
data(simulatedData)
```

Examples

```
library("stats")
library("MASS")
library("Matrix")
data(simulatedData)
y = simulatedData$Y
w = simulatedData$W
fit <- rbsrp(y,w)

data(breastdata)
chrom = breastdata$chrom
```

rbsrp *RBS based on the random projection approach*

Description

Select the response variables and estimate regression coefficients simultaneously for multivariate linear regression without covariance of responses based on the random projection approach.

Usage

```
rbsrp(Y, X, steplen = 0.00125)
```

Arguments

Y	A $n \times q$ Response matrix.
X	A $n \times p$ Numeric design matrix for the model.
steplen	The step length of α. Default is steplen=0.00125.

Value

A list

- bestset - The selected subscript position of the response best subset.
- bestdecision - The estimation of the δ.

References

Liu, X., Hu, J., and Liu, X. (2024). Random Projection-Based Response Best-Subset Selector for Ultrahigh Dimensional Multi-Outcome Data. Manuscript.

Examples

```
library("stats")
library("MASS")
library("Matrix")
n   <- 200
p   <- 5
q   <- 10
q0  <- 5
beta <- matrix(runif(p*q0),p,q0)
eps <- matrix(rnorm(n*q),n,q)
x <- matrix(rnorm(n*p),n,p)
y <- cbind(x%*%beta, matrix(0,n,q-q0)) + eps
fit <- rbsrp(y,x)
fit$bestdecision
fit$bestset

data(simulatedData)
y = simulatedData$Y
w = simulatedData$W
fit <- rbsrp(y,w)
```

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