Package ‘sparseCov’

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Title Sparse Covariance Estimation Based on Thresholding

Version 0.0.1

Description A sparse covariance estimator based on different thresholding operators.

License GPL (>= 2)

Encoding UTF-8

RoxygenNote 7.3.1

Imports Matrix, methods, mvnfast, Rfast, sparseMVN, stats

URL https://github.com/chexjiang/sparseCov

NeedsCompilation no

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R topics documented:

block.true.cov — *This function construct a covariance matrix with a block diagonal structure.*

Description

This function construct a covariance matrix with a block diagonal structure.

Usage

```
block.true.cov(p, block.size = 3)
```

Arguments

p	The number of variants.
block.size	The block size.

Value

A covariance matrix with a block diagonal structure.

Examples

```
data.true.cov <- block.true.cov(30)
data.true.cov[1:9,1:9]
```

est_delta — *This function select the optimal thresholding level delta*

Description

This function select the optimal thresholding level delta

Usage

```
est_delta(
  data,
  method = c("cv", "qiu"),
  operator = c("hard", "soft", "scad", "al")
)
```

Arguments

data	The data matrix.
method	The choice of method to select the optimal threshold level.
operator	The choice of thresholding operator.

Value

The optimal threshold level.

Examples

```
## generate data from a block diagonal covariance matrix structure
n <- 50
p <- 30
data.true.cov <- block.true.cov(p)
data <- sampleMVN(n, data.true.cov, sparse=TRUE)
## select the optimal thresholding level delta
delta <- est_delta(data, method='cv', operator='scad')
```

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est_sparseCov — *This function computes the thresholding sparse covariance/correlation estimator with the optimal threshold level.*

Description

This function computes the thresholding sparse covariance/correlation estimator with the optimal threshold level.

Usage

```
est_sparseCov(
  data,
  method = c("cv", "qiu"),
  operator = c("hard", "soft", "scad", "al"),
  corr = TRUE
)
```

Arguments

`data`	The data matrix.
`method`	The choice of method to select the optimal threshold level.
`operator`	The choice of the thresholding operator.
`corr`	The indicator of computing correlation or covariance matrix.

Value

The thresholding sparse covariance/correlation estimator.

Examples

```
## generate data from a block diagonal covariance matrix structure
n <- 50
p <- 30
data.true.cov <- block.true.cov(p)
data <- sampleMVN(n, data.true.cov, sparse=TRUE)
## compute the thresholding sparse covariance/correlation estimator
s <- est_sparseCov(data, method='cv', operator='scad', corr=FALSE)
```

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sampleMVN — *This function samples MVN based on a given covariance matrix*

Description

This function samples MVN based on a given covariance matrix

Usage

```
sampleMVN(n, Sigma, sparse = TRUE, n_cores = 1, fastmvn = FALSE)
```

Arguments

n	The sample size.
Sigma	The covariance matrix.
sparse	The indicator of sparse sampling or not.
n_cores	The number of cores used.
fastmvn	The indicator of fast sampling or not.

Value

The data matrix sampled from the covariance matrix.

Examples

```
## generate data from a block diagonal covariance matrix structure
n <- 50
p <- 30
data.true.cov <- block.true.cov(p)
data <- sampleMVN(n, data.true.cov, sparse=TRUE)
data[1:10, 1:10]
```

thresh_op — *This function computes the thresholding sparse covariance estimator for a given threshold level.*

Description

This function computes the thresholding sparse covariance estimator for a given threshold level.

Usage

```
thresh_op(z, operator, delta, n)
```

Arguments

z	The sample covariance matrix.
operator	The choice of the thresholding operator.
delta	The thresholding level.
n	The sample size of data matrix.

Value

The thresholding sparse covariance estimator for a given threshold level.

Examples

```
## generate data from a block diagonal covariance matrix structure
n <- 50
p <- 30
data.true.cov <- block.true.cov(p)
data <- sampleMVN(n, data.true.cov, sparse=TRUE)
## compute the sample covariance
z <- Rfast::cova(data) *(n-1)/n
## get the sparse covariance matrix estimator for a given threshold level
s <- thresh_op(z, operator='soft', delta=1, n=n)
s[1:9,1:9]
```

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