

Package ‘SQDA’

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Type Package

Title Sparse Quadratic Discriminant Analysis

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Depends R (>= 2.10)

Imports limma (>= 3.18.13), PDSCE (>= 1.2), mvtnorm (>= 0.9.99992)

Description Sparse Quadratic Discriminant Analysis (SQDA) can be performed. In SQDA, the covariance matrix are assumed to be block-diagonal. And, for each block, sparsity assumption is imposed on the covariance matrix. It is useful in high-dimensional setting.

License GPL-3

NeedsCompilation no

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 SQDA-package

Sparse Quadratic Discriminant Analysis

Description

This package is used to perform Sparse Quadratic Discriminant Analysis (SQDA). In SQDA, the covariance matrix are assumed to be block-diagonal. And, for each block, sparsity assumption is imposed on the covariance matrix. It is useful in high-dimensional setting.

Details

Package: SQDA
 Type: Package
 Version: 1.0
 Date: 2014-09-19
 License: GPL-3

The package has one function, `sQDA()`, which basically takes in several parameters and output the predictions on the new dataset based on the sparse quadratic discriminant analysis. More details on the algorithms see the reference below.

Author(s)

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References

The application of sparse estimation of covariance matrix to quadratic discriminant analysis. Jiehuan Sun and Hongyu Zhao.

Examples

```
data(exampldata)
res<-sQDA(train.data[1:100,],test.data[1:100,],lams=0.2,prese1=FALSE)
sum(res$pred!=colnames(test.data))/ncol(test.data) ##prediction error
res$p ## number of blocks selected
res$pred ## predicted class labels on test.data
```

 cross

generate cross-validation ids

Description

generate cross-validation ids

Usage

```
cross(data = NULL, cv = 5)
```

Arguments

data	data matrix with column names being the class labels and row names being the genes.
cv	the cross-validation folds

Value

cross-validation ids that can be used to split data into training data and testing data.

exampledata	<i>exampledata</i>
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Description

simulated example data

sGda	<i>Prediction function</i>
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Description

Prediction function

Usage

```
sGda(data = NULL, data.new = NULL, lam = 0)
```

Arguments

data	data matrix with column names being the class labels and row names being the genes.
data.new	the new data needs to be predicted.
lam	optimal lambda from cross-validation.

Value

returns a list object with following items.

pred	predictions for class labels on the new dataset
lik	likelihood of each class on the new dataset

sGdaCV2 *Cross-validation function*

Description

Cross-validation function

Usage

```
sGdaCV2(data = NULL, cv = 5, lam = 0)
```

Arguments

data	data matrix with column names being the class labels and row names being the genes.
cv	cross-validation folds.
lam	a sequence of lambda's.

Value

returns a list object with following item.

cv.error	cross-validation errors for each lambda
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simpleAGG3 *Blockwise classifiers*

Description

Blockwise classifiers

Usage

```
simpleAGG3(data = NULL, data.new = NULL, len = 100, times = 100,
  lam = seq(0, 0.1, length = 10))
```

Arguments

data	data matrix with column names being the class labels and row names being the genes.
data.new	the new data needs to be predicted.
len	block size
times	number of blocks
lam	a sequence of lambda's from cross-validation.

Value

returns a list object with following items.

cv.error	cross-validation errors for each block
pred	predictions for class labels on the new dataset
lik	likelihood of each class on the new dataset

sortgene	<i>Gene sorter</i>
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Description

Gene sorter

Usage

```
sortgene(data = NULL)
```

Arguments

data	data matrix with column names being the class labels and row names being the genes.
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Value

topTable data structure from limma.

sQDA	<i>Spase Quadratic Discriminant Analysis</i>
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Description

Spase Quadratic Discriminant Analysis

Usage

```
sQDA(train.data = NULL, test.data = NULL, len = 100, lams = seq(0.02, 1,
length = 10), prese1 = T, prelam = 0.2, margin = 0.05)
```

Arguments

train.data	data matrix with column names being the class labels and row names being the genes.
test.data	the new data needs to be predicted.
len	block size
lams	a sequence of lambda's from cross-validation.
presel	pre-selection indicator.
prelam	pre-selection sparsity parameter, only used when presel=T.
margin	error margin for pre-selection, only used when presel=T.

Value

returns a list object with following items.

pred	predictions for class labels on the test.data
p	the number of blocks selected

References

The application of sparse estimation of covariance matrix to quadratic discriminant analysis. Jiehuan Sun and Hongyu Zhao.

Examples

```
data(exampladata)
res<-sQDA(train.data[1:100,],test.data[1:100,],lams=0.2,presel=FALSE)
sum(res$pred!=colnames(test.data))/ncol(test.data) ##prediction error
res$p ## number of blocks selected
res$pred ## predicted class labels on test.data
```

test.data	<i>testing data</i>
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Description

simulated testing data

train.data	<i>training data</i>
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Description

simulated training data

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