

Package ‘PLPE’

August 9, 2025

Version 1.69.0

Date 2009-07-22

Title Local Pooled Error Test for Differential Expression with Paired High-throughput Data

Author HyungJun Cho <hj4cho@korea.ac.kr> and
Jae K. Lee <jaeklee@virginia.edu>

Maintainer Soo-heang Eo <hanansh@korea.ac.kr>

Depends R (>= 2.6.2), Biobase (>= 2.5.5), LPE, MASS, methods

Description This package performs tests for paired high-throughput data.

biocViews Proteomics, Microarray, DifferentialExpression

LazyLoad yes

LazyData yes

License GPL (>= 2)

URL <http://www.korea.ac.kr/~stat2242/>

git_url <https://git.bioconductor.org/packages/PLPE>

git_branch devel

git_last_commit fac1d5a

git_last_commit_date 2025-04-15

Repository Bioconductor 3.22

Date/Publication 2025-08-08

Contents

am.trans.paired	2
base.error.paired	2
generate.null	3
lpe.paired	3
lpe.paired.default	4
lpe.paired.fdr	6
lpe.paired.fdr.default	7
plateletSet	8
print.lpe.paired	8
print.lpe.paired.fdr	9
summary.lpe.paired	10
summary.lpe.paired.fdr	11

Index**12**

am.trans.paired	<i>Local Pooled Error Test for Paired Data</i>
-----------------	--

Description

This is internal function in lpe.paired.

Usage

```
am.trans.paired(y, design)
```

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, Proteomics, 7:3681-3692.

See Also

[lpe.paired.default](#)

base.error.paired	<i>Local Pooled Error Test for Paired Data</i>
-------------------	--

Description

This is internal function in lpe.paired.

Usage

```
base.error.paired(x, design, est.A, estimator, q, data.type)
```

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, Proteomics, 7:3681-3692.

See Also

[lpe.paired.default](#)

generate.null	<i>Local Pooled Error Test for Paired Data</i>
---------------	--

Description

This is internal function in lpe.paired.

Usage

```
generate.null(x, design, q)
```

Arguments

x	data matrix
design	design matrix; condition index in the first column and pair index in the sceond column
q	quantile for intervals of intensities

Value

design	design matrix; condition index in the first column and pair index in the sceond column
q	quantile for intervals of intensities

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, Proteomics, 7:3681-3692.

See Also

[lpe.paired.default](#)

lpe.paired	<i>Local Pooled Error Test for Paired Data</i>
------------	--

Description

This invetigates differential expression for paired high-throughput data.

Usage

```
lpe.paired(x,...)
```

Arguments

x an object for which the extraction of model lpe.paired is meaningful.
 ... other arguments

Value

x design matrix; condition index in the first column and pair index in the second column
 ... data type: 'ms' for mass spectrometry data, 'cdna' for cDNA microarray data

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

See Also

[lpe.paired.default](#)

Examples

```
#LC-MS/MS proteomic data for platelets MPs
library(PLPE)
data(plateletSet)
x <- exprs(plateletSet)
x <- log2(x)

cond <- c(1, 2, 1, 2, 1, 2)
pair <- c(1, 1, 2, 2, 3, 3)
design <- cbind(cond, pair)

out <- lpe.paired(x, design, q=0.1, data.type="ms")
out$test.out[1:10,]
```

lpe.paired.default	<i>Local Pooled Error Test for Paired Data</i>
--------------------	--

Description

This investigates differential expression for paired high-throughput data.

Usage

```
## Default S3 method:
lpe.paired(x, design, data.type, q=0.01, probe.ID = NULL, estimator="median", w=0.5, w.estimator="f
```

Arguments

x	data matrix
design	design matrix; condition index in the first column and pair index in the second column
q	quantile for intervals of intensities
probe.ID	probe set IDs; if NULL, row numbers are assigned.
data.type	data type: 'ms' for mass spectrometry data, 'cdna' for cDNA microarray data
estimator	specification for the estimator: 'median', 'mean' and 'huber'
w	weight parameter between individual variance estimate and pooling variance estimate, $0 \leq w \leq 1$
w.estimator	two approaches to estimate the weight: 'random' or 'fixed'
iseed	seed number
...	other arguments

Value

design	design matrix; condition index in the first column and pair index in the second column
data.type	data type: 'ms' for mass spectrometry data, 'cdna' for cDNA microarray data
q	quantile for intervals of intensities
estimator	specification for the estimator: 'median', 'mean' and 'huber'
w.estimator	two approaches to estimate the weight: 'random' or 'fixed'
w	weight parameter between individual variance estimate and pooling variance estimate, $0 \leq w \leq 1$
test.out	matrix for test results

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

See Also

[lpe.paired](#)

Examples

```
#LC-MS/MS proteomic data for platelets MPs
library(PLPE)
data(plateletSet)
x <- exprs(plateletSet)
x <- log2(x)

cond <- c(1, 2, 1, 2, 1, 2)
```

```

pair <- c(1, 1, 2, 2, 3, 3)
design <- cbind(cond, pair)

out <- lpe.paired(x, design, q=0.1, data.type="ms")
out$test.out[1:10,]
summary(out)

```

lpe.paired.fdr

FDR for PLPE

Description

This computes FDR for PLPE.

Usage

```
lpe.paired.fdr(x, ...)
```

Arguments

x	data matrix
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

See Also

[lpe.paired.fdr.default](#)

Examples

```

#LC-MS/MS proteomic data for platelets MPs
library(PLPE)
data(plateletSet)
x <- exprs(plateletSet)
x <- log2(x)

cond <- c(1, 2, 1, 2, 1, 2)
pair <- c(1, 1, 2, 2, 3, 3)
design <- cbind(cond, pair)

out <- lpe.paired(x, design, q=0.1, data.type="ms")
out.fdr <- lpe.paired.fdr(x,obj=out)
out.fdr$FDR[1:10,]

```

lpe.paired.fdr.default
FDR for PLPE

Description

This computes FDR for PLPE.

Usage

```
## Default S3 method:  
lpe.paired.fdr(x, obj, n.iter=5, lambda=0.9, ...)
```

Arguments

x	data matrix
obj	object created from lpe.paired
n.iter	number of iterations
lambda	numeric vector of probabilities with values in [0,1]
...	other argument

Value

design	design matrix; condition index in the first column and pair index in the second column
data.type	data type: 'ms' for mass spectrometry data, 'cdna' for cDNA microarray data
estimator	specification for the estimator: 'median', 'mean' and 'huber'
w.estimator	two approaches to estimate the weight: 'random' or 'fixed'
w	weight parameter between individual variance estimate and pooling variance estimate, $0 \leq w \leq 1$
pi0	estimated proportion of non-null peptides
FDR	matrix for test results including FDRs
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

See Also

[lpe.paired.fdr](#)

Examples

```
#LC-MS/MS proteomic data for platelets MPs
library(PLPE)
data(plateletSet)
x <- exprs(plateletSet)
x <- log2(x)

cond <- c(1, 2, 1, 2, 1, 2)
pair <- c(1, 1, 2, 2, 3, 3)
design <- cbind(cond, pair)

out <- lpe.paired(x, design, q=0.1, data.type="ms")
out.fdr <- lpe.paired.fdr(x,obj=out)
out.fdr$FDR[1:10,]
```

plateletSet	<i>LCMS proteomic data for platelets MPs</i>
-------------	--

Description

This data set consists of LC-MS/MS data with three replicates of paired samples.

Source

Garcia BA, Smalley DM, Cho H, Shabanowitz J, Ley K and Hunt DF (2005). The Platelet Microparticle Proteome, Journal of Proteome Research, 4:1516-1521.

print.lpe.paired	<i>Local Pooled Error Test for Paired Data</i>
------------------	--

Description

This print lpe.paired.

Usage

```
## S3 method for class 'lpe.paired'
print(x,...)
```

Arguments

x	an object created from lpe.paired
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

Examples

```
#LC-MS/MS proteomic data for platelets MPs
library(PLPE)
data(plateletSet)
x <- exprs(plateletSet)
x <- log2(x)

cond <- c(1, 2, 1, 2, 1, 2)
pair <- c(1, 1, 2, 2, 3, 3)
design <- cbind(cond, pair)

out <- lpe.paired(x, design, q=0.1, data.type="ms")
out
```

print.lpe.paired.fdr *Local Pooled Error Test for Paired Data*

Description

This prints lpe.paired.fdr

Usage

```
## S3 method for class 'lpe.paired.fdr'
print(x,...)
```

Arguments

x	an object created from lpe.paired
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

summary.lpe.paired	<i>Local Pooled Error Test for Paired Data</i>
--------------------	--

Description

This summarize lpe.paired.

Usage

```
## S3 method for class 'lpe.paired'  
summary(object,...)
```

Arguments

x	an object created from lpe.paired
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

Examples

```
#LC-MS/MS proteomic data for platelets MPs  
library(PLPE)  
data(plateletSet)  
x <- exprs(plateletSet)  
x <- log2(x)  
  
cond <- c(1, 2, 1, 2, 1, 2)  
pair <- c(1, 1, 2, 2, 3, 3)  
design <- cbind(cond, pair)  
  
out <- lpe.paired(x, design, q=0.1, data.type="ms")  
summary(out)
```

`summary.lpe.paired.fdr`*Local Pooled Error Test for Paired Data*

Description

This summarize lpe.paired.

Usage

```
## S3 method for class 'lpe.paired.fdr'  
summary(object,...)
```

Arguments

x	an object created from lpe.paired
...	other arguments

Author(s)

HyungJun Cho and Jae K. Lee

References

Cho H, Smalley DM, Ross MM, Theodorescu D, Ley K and Lee JK (2007). Statistical Identification of Differentially Labelled Peptides from Liquid Chromatography Tandem Mass Spectrometry, *Proteomics*, 7:3681-3692.

Index

- * **datasets**
 - plateletSet, 8
- * **internal**
 - am.trans.paired, 2
 - base.error.paired, 2
 - generate.null, 3
 - print.lpe.paired, 8
 - print.lpe.paired.fdr, 9
 - summary.lpe.paired, 10
 - summary.lpe.paired.fdr, 11
- * **models**
 - lpe.paired, 3
 - lpe.paired.default, 4
 - lpe.paired.fdr, 6
 - lpe.paired.fdr.default, 7

am.trans.paired, 2

base.error.paired, 2

generate.null, 3

lpe.paired, 3, 5

lpe.paired.default, 2–4, 4

lpe.paired.fdr, 6, 7

lpe.paired.fdr.default, 6, 7

plateletSet, 8

print.lpe.paired, 8

print.lpe.paired.fdr, 9

summary.lpe.paired, 10

summary.lpe.paired.fdr, 11