

Package ‘powerPLS’

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aqueous_humour	<i>Aqueous Humour data</i>
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Description

59 post-mortem aqueous humor samples collected from closed and opened sheep eyes

Usage

aqueous_humour

Format

A data frame with 59 rows and 45 variables:

- ID** ID observation
- group** class membership (C, O)
- R1** metabolic values
- R2** metabolic values
- R3** metabolic values
- R4** metabolic values
- R5** metabolic values
- R6** metabolic values
- R7** metabolic values
- R8** metabolic values
- R9** metabolic values
- R10** metabolic values
- R11** metabolic values
- R12** metabolic values

R13 metabolic values
R14 metabolic values
R15 metabolic values
R16 metabolic values
R17 metabolic values
R18 metabolic values
R19 metabolic values
R20 metabolic values
R21 metabolic values
R22 metabolic values
R23 metabolic values
R24 metabolic values
R25 metabolic values
R26 metabolic values
R27 metabolic values
R28 metabolic values
R29 metabolic values
R30 metabolic values
R31 metabolic values
R32 metabolic values
R33 metabolic values
R34 metabolic values
R35 metabolic values
R36 metabolic values
R37 metabolic values
R38 metabolic values
R39 metabolic values
R40 metabolic values
R41 metabolic values
R42 metabolic values
R43 metabolic values

Author(s)

Angela Andreella <angela.andreella@unive.it>

References

<https://link.springer.com/article/10.1007/s11306-019-1533-2>

AUCTest

*AUC test***Description**

Performs permutation-based test based on AUC

Usage

```
AUCTest(X, Y, nperm = 100, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE,...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
cross.validation	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
...	additional arguments related to cross.validation. See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if randomization = FALSE
pv_adj adjusted p-value. It equals NA if randomization = FALSE
test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [dQ2Test](#), [sensitivityTest](#), [F1Test](#), [R2Test](#), [specificityTest](#), [FMTest](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- AUCTest(X = datas$X, Y = datas$Y, A = 1)
out
```

computePower	<i>Power estimation</i>
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Description

Estimates power for a given sample size, type I error level and number of score components.

Usage

```
computePower(X, Y, A, n, seed = 123,
Nsim = 100, nperm = 200, alpha = 0.05,
scaling = 'auto-scaling', test = 'R2',
Y.prob = FALSE, eps = 0.01, post.transformation = TRUE,
fast = FALSE, transformation = 'clr', ncores = NULL)
```

Arguments

X	Data matrix where columns represent the p variables and rows the n observations.
Y	Data matrix where columns represent the two classes and rows the n observations.
A	Number of score components
n	Sample size
seed	Seed value
Nsim	Number of simulations
nperm	Number of permutations
alpha	Type I error level
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default to 'auto-scaling'

test	Type of test statistic, one of c('score', 'mcc', 'R2'). Default to 'R2'.
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default to TRUE
fast	Use the function fk_density from the FKSUM R package for kernel density estimation. Default to FALSE.
transformation	Transformation used to map Y in probability data vector. The options are 'ilr' and 'clr'.
ncores	Number of cores, default NULL.

Value

Returns a matrix of estimated power for each number of components and tests selected.

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

Examples

```
## Not run:
datas <- simulatePilotData(nvar = 10, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- computePower(X = datas$X, Y = datas$Y, A = 3, n = 20, test = 'R2')

## End(Not run)
```

computeSampleSize	<i>Sample size estimation</i>
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Description

Compute optimal sample size

Usage

```
computeSampleSize(n, X, Y, A, alpha, beta,
nperm, Nsim, seed, test = 'R2',...)
```

Arguments

n	Vector of sample sizes to consider
X	Data matrix where columns represent the p variables and rows the n observations.
Y	Data matrix where columns represent the two classes and rows the n observations.
A	Number of score components
alpha	Type I error level. Default to 0.05
beta	Type II error level. Default to 0.2.
nperm	Number of permutations. Default to 100.
Nsim	Number of simulations. Default to 100.
seed	Seed value
test	Type of test, one of c('score', 'mcc', 'R2'). Default to 'R2'.
...	Further parameters.

Value

Returns a data frame that contains the estimated power for each sample size and number of components considered

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

[computePower](#)

Examples

```
## Not run:
datas <- simulatePilotData(nvar = 10, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- computeSampleSize(X = datas$X, Y = datas$Y, A = 2, A = 3, n = 20, test = 'R2')

## End(Not run)
```

dQ2Test

*dQ2 test***Description**

Performs permutation-based test based on dQ2

Usage

```
dQ2Test(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, class = 1, cross.validation = FALSE, ...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
class	Numeric value. Specify the reference class. Default 1
cross.validation	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
...	additional arguments related to cross.validation. See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if randomization = FALSE

pv_adj adjusted p-value. It equals NA if randomization = FALSE

test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [sensitivityTest](#), [specificityTest](#), [AUCTest](#), [R2Test](#), [FMTest](#), [F1Test](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 1)
out <- dQ2Test(X = datas$X, Y = datas$Y, A = 1)
out
```

F1Test	<i>F1 test</i>
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Description

Performs permutation-based test based on F1

Usage

```
F1Test(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE,cross.validation = FALSE,...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector

`scaling` Type of scaling, one of `c('auto-scaling', 'pareto-scaling', 'mean-centering')`. Default 'auto-scaling'.

`post.transformation` Boolean value. TRUE if you want to apply post transformation. Default TRUE

`cross.validation` Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation

`...` additional arguments related to `cross.validation`. See [repeatedCV_test](#)

Value

List with the following objects:

`pv` raw p-value. It equals NA if `randomization = FALSE`

`pv_adj` adjusted p-value. It equals NA if `randomization = FALSE`

`test` estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [dQ2Test](#), [sensitivityTest](#), [AUCTest](#), [R2Test](#), [specificityTest](#), [FMTest](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(15,15),m = 6,nvar_rel = 5,A = 1)
out <- F1Test(X = datas$X, Y = datas$Y, A = 1)
out
```

FMTest

*FM test***Description**

Performs permutation-based test based on FM

Usage

```
FMTest(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE, ...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
cross.validation	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
...	additional arguments related to cross.validation. See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if randomization = FALSE
pv_adj adjusted p-value. It equals NA if randomization = FALSE
test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [dQ2Test](#), [sensitivityTest](#), [AUCTest](#), [R2Test](#), [specificityTest](#), [F1Test](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 1)
out <- FMTest(X = datas$X, Y = datas$Y, A = 1)
out
```

mccTest	<i>MCC test</i>
---------	-----------------

Description

Performs permutation-based test based on Matthews Correlation Coefficient

Usage

```
mccTest(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE, seed = 123, ...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE

`cross.validation` Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by nested cross-validation

`seed` Seed value

`...` additional arguments related to `cross.validation`. See [repeatedCV_test](#)

Value

List with the following objects:

pv raw p-value. It equals NA if `randomization = FALSE`

pv_adj adjusted p-value. It equals NA if `randomization = FALSE`

test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [AUCTest](#), [scoreTest](#), [dQ2Test](#), [sensitivityTest](#), [AUCTest](#), [R2Test](#), [specificityTest](#), [FMTest](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(15,15),m = 6,nvar_rel = 5,A = 1)
out <- mccTest(X = datas$X, Y = datas$Y, A = 1)
out
```

PLSc

PLS classification

Description

Performs Partial Least Squares classification

Usage

```
PLSc(X, Y, A, scaling = 'auto-scaling', post.transformation = TRUE,
eps = 0.01, Y.prob = FALSE, transformation = 'ilr')
```

Arguments

X	Data matrix where columns represent the p variables and rows the n observations.
Y	Data matrix where columns represent the two classes and rows the n observations.
A	Number of score components
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default to 'auto-scaling'
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
transformation	Transformation used to map Y in probability data vector. The options are 'ilr' and 'clr'. Default @ilr.

Value

List with the following objects:

W Matrix of weights

X_loading Matrix of X loading

Y_loading Matrix of Y loading

X Matrix of X data (predictor variables)

Y Matrix of Y data (dependent variable)

T_score Matrix of scores

Y_fitted Fitted Y matrix

B Matrix regression coefficients

M Number of orthogonal components if post.transformation=TRUE is applied.

Author(s)

Angela Andreella

References

Stocchero, M., De Nardi, M., & Scarpa, B. (2021). PLS for classification. *Chemometrics and Intelligent Laboratory Systems*, 216, 104374.

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- PLSc(X = datas$X, Y = datas$Y, A = 3)
```

R2Test

*R2 test***Description**

Performs permutation-based test based on R2

Usage

```
R2Test(X, Y, nperm = 100, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE, seed = 123, ...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
cross.validation	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
seed	Seed value
...	additional arguments related to cross.validation. See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if randomization = FALSE
pv_adj adjusted p-value. It equals NA if randomization = FALSE
test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [sensitivityTest](#), [specificityTest](#), [AUCTest](#), [dQ2Test](#), [FMTest](#), [F1Test](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- R2Test(X = datas$X, Y = datas$Y, A = 1)
out
```

repeatedCV_test	<i>Repeated k-Fold Cross-Validation with Custom Test Metrics</i>
-----------------	--

Description

This function performs repeated k-fold cross-validation and computes a selected performance metric across all repetitions and folds. It allows for different types of performance tests, such as MCC, sensitivity, specificity, R2, F1, and more.

Usage

```
repeatedCV_test(
  data,
  labels,
  k_folds = 5,
  repeats = 3,
  A = 1,
  test_type = "mccTest",
  seed = 1234
)
```

Arguments

- data A data frame or matrix of features (predictor variables).
- labels A vector of class labels corresponding to the rows of data.
- k_folds An integer specifying the number of cross-validation folds (default = 5).

repeats	An integer specifying the number of times the cross-validation is repeated (default = 3).
A	number of score components
test_type	A character string specifying the type of test to use. Options include: • 'mccTest' for Matthews Correlation Coefficient (MCC), • 'sensitivityTest' for Sensitivity, • 'specificityTest' for Specificity, • 'R2Test' for R-squared, • 'scoreTest' for Score, • 'F1Test' for F1 Score, • 'FMTest' for Fowlkes-Mallows Index (FM), • 'AUCTest' for Area Under the Curve (AUC), • 'dQ2Test' for dQ2. Default is 'mccTest'.
seed	An integer for setting the random seed to ensure reproducibility (default = 1234).

Value

A numeric value representing the average performance metric across the outer folds.

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(15,15),m = 6,nvar_rel = 5,A = 1)
data <- datas$X
labels <- datas$Y
mean_mcc <- repeatedCV_test(data, labels, A = 1, test_type = 'mccTest')
cat('Mean MCC:', mean_mcc, '\n')

mean_score <- repeatedCV_test(data, labels, A = 1, test_type = 'scoreTest')
cat('Mean Sensitivity:', mean_score, '\n')
```

scoreTest	<i>Score test</i>
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Description

Performs permutation-based test based on predictive score vector

Usage

```
scoreTest(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE, seed = 123, ...)
```

Arguments

<code>X</code>	data matrix where columns represent the p variables and rows the n observations.
<code>Y</code>	data matrix where columns represent the two classes and rows the n observations.
<code>nperm</code>	number of permutations. Default to 200.
<code>A</code>	number of score components
<code>randomization</code>	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
<code>Y.prob</code>	Boolean value. Default FALSE. IF TRUE Y is a probability vector
<code>eps</code>	Default 0.01. eps is used when <code>Y.prob = FALSE</code> to transform Y in a probability vector
<code>scaling</code>	Type of scaling, one of <code>c('auto-scaling', 'pareto-scaling', 'mean-centering')</code> . Default 'auto-scaling'.
<code>post.transformation</code>	Boolean value. TRUE if you want to apply post transformation. Default TRUE
<code>cross.validation</code>	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
<code>seed</code>	Seed value
<code>...</code>	additional arguments related to <code>cross.validation</code> . See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if `randomization = FALSE`
pv_adj adjusted p-value. It equals NA if `randomization = FALSE`
test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [R2Test](#), [sensitivityTest](#), [specificityTest](#), [AUCTest](#), [dQ2Test](#), [FMTTest](#), [F1Test](#).

Examples

```

datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- scoreTest(X = datas$X, Y = datas$Y, A = 1)
out

```

sensitivityTest	<i>sensitivity test</i>
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Description

Performs permutation-based test based on sensitivity

Usage

```

sensitivityTest(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE, cross.validation = FALSE, ...)

```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector
scaling	Type of scaling, one of c('auto-scaling', 'pareto-scaling', 'mean-centering'). Default 'auto-scaling'.
post.transformation	Boolean value. TRUE if you want to apply post transformation. Default TRUE
cross.validation	Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation
...	additional arguments related to cross.validation. See repeatedCV_test

Value

List with the following objects:

pv raw p-value. It equals NA if randomization = FALSE
pv_adj adjusted p-value. It equals NA if randomization = FALSE
test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [dQ2Test](#), [specificityTest](#), [AUCTest](#), [R2Test](#), [FMTest](#), [F1Test](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 1)
out <- sensitivityTest(X = datas$X, Y = datas$Y, A = 1)
out
```

simulatePilotData	<i>Simulate pilot data</i>
-------------------	----------------------------

Description

Simulate cluster pilot data

Usage

```
simulatePilotData(seed = 123, nvar, clus.size, nvar_rel,m, A = 2, S1 = NULL, S2 = NULL)
```

Arguments

seed	Seed value
nvar	Number of variables
clus.size	Vector of two elements, specifying the size of classes (only two classes are considered)
nvar_rel	Number of variables relevant to predict the dependent variable
m	Effect size of separation between classes
A	Oracle number of score components
S1	Covariance matrix for the first class. Default NULL, i.e., the identity is considered.
S2	Covariance matrix for the second class. DefaultNULL, i.e., the identity is considered.

Author(s)

Angela Andreella @return List with the following objects:

X matrix of predictor variables with nvar columns and the sum of clus.size values as number of rows.

Y vector of dependent variable with the sum of clus.size values as length

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

Examples

```
datas <- simulatePilotData(nvar = 10, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
```

sim_XY	<i>Simulate pilot data</i>
--------	----------------------------

Description

Simulate data matrix under the alternative hypothesis with n observations by kernel density estimation

Usage

```
sim_XY(out, n, seed = 123, post.transformation = TRUE, A, fast = FALSE)
```

Arguments

out	Output from PLSc
n	Number of observations to simulate
seed	Seed value
post.transformation	Boolean value. Default to TRUE, i.e., post transformation is applied in PLSc
A	Number of score components used in PLSc.
fast	Use the function fk_density from the FKSUM R package for kernel density estimation. Default to FALSE.

Value

Returns a list:

Y_H1 dependent variable, matrix with 2 columns and n rows (observations)

X_H1 predictor variables, matrix with n rows (observations) and number of columns equal to out\$X (i.e., original dataset)

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:
Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

[PLSc](#), [ptPLSc](#)

Examples

```
datas <- simulatePilotData(nvar = 10, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 2)
out <- PLSc(X = datas$X, Y = datas$Y, A = 3)
out_sim <- sim_XY(out = out, n = 10, A = 3)
```

specificityTest	<i>specificity test</i>
-----------------	-------------------------

Description

Performs permutation-based test based on specificity

Usage

```
specificityTest(X, Y, nperm = 200, A, randomization = FALSE,
Y.prob = FALSE, eps = 0.01, scaling = 'auto-scaling',
post.transformation = TRUE,cross.validation = FALSE,...)
```

Arguments

X	data matrix where columns represent the p variables and rows the n observations.
Y	data matrix where columns represent the two classes and rows the n observations.
nperm	number of permutations. Default to 200.
A	number of score components
randomization	Boolean value. Default to FALSE. If TRUE the permutation p-value is computed
Y.prob	Boolean value. Default FALSE. IF TRUE Y is a probability vector
eps	Default 0.01. eps is used when Y.prob = FALSE to transform Y in a probability vector

`scaling` Type of scaling, one of `c('auto-scaling', 'pareto-scaling', 'mean-centering')`. Default 'auto-scaling'.

`post.transformation` Boolean value. TRUE if you want to apply post transformation. Default TRUE

`cross.validation` Boolean value. Default FALSE. TRUE if you want to compute the observed test statistic by Nested cross-validation

`...` additional arguments related to `cross.validation`. See [repeatedCV_test](#)

Value

List with the following objects:

pv raw p-value. It equals NA if `randomization = FALSE`

pv_adj adjusted p-value. It equals NA if `randomization = FALSE`

test estimated test statistic

Author(s)

Angela Andreella

References

For the general framework of power analysis for PLS-based methods see:

Andreella, A., Fino, L., Scarpa, B., & Stocchero, M. (2024). Towards a power analysis for PLS-based methods. arXiv preprint <https://arxiv.org/abs/2403.10289>.

See Also

Other test statistics implemented: [mccTest](#), [scoreTest](#), [dQ2Test](#), [sensitivityTest](#), [AUCTest](#), [R2Test](#), [FMTest](#), [F1Test](#).

Examples

```
datas <- simulatePilotData(nvar = 30, clus.size = c(5,5),m = 6,nvar_rel = 5,A = 1)
out <- specificityTest(X = datas$X, Y = datas$Y, A = 1)
out
```

wheezing

Wheezing data

Description

32 urine samples from children at risk of early-onset asthma and those with transient wheezing.

Usage

wheezing

Format

A data frame with 32 rows and 176 variables

Author(s)

Angela Andreella <angela.andreella@unive.it>

References

<https://onlinelibrary.wiley.com/doi/10.1111/pai.12879>

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