Package 'PSA'

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Title Principal Nested Simplices Analysis

Version 0.0.0.9000

Description What the package does (one paragraph).

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Imports stats,
utils,
graphics,
ggplot2 (>= 3.4.0),
dendextend,
compositions

Depends R (>= 4.0.0)

Suggests testthat (>= 3.0.0)

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Contents

compare_analysis *Comparison of PSA and Benchmark Methods*

Description

A wrapper function of PSA and benchmark methods for convenience

Usage

```
compare_analysis(X)
```

Arguments

X	a data matrix

Value

a list of data matrix X and outcomes of PSA-S, PSA-O, PCA, log-ratio PCA, and power transform PCA with power 1/2.

See Also

psa(), comp_pca(), comp_apca(), comp_power_pca()

comp_apca *Log-Ratio Principal Component Analysis for PSA Comparison*

Description

A wrapper function of princomp.acomp() for comparison to PSA. Zeros are substituted by half of the overall nonzero minimum. Manipulates result of princomp.acomp() in a similar format to psa().

Usage

```
comp_apca(X)
```

Arguments

X	a data matrix.

Value

A list

- pts.approx a list of lower dimensional representations with respect to the original basis
- scores a matrix of scores.
- rss a vector of residual sums of squares.
- modes a list of modes of variation. The rth element of the list is the difference of rank r approximations to rank $r-1$ approximations.
- loadings a matrix of loading vectors.
- center mean of the data

See Also

comp_pca(), psa()

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comp_pca *Principal Component Analysis for PSA Comparison*

Description

A wrapper function of princomp() for comparison to PSA. Manipulates result of princomp() in a similar format to psa().

Usage

```
comp_pca(X)
```

Arguments

X	a data matrix.

Value

A list

- pts.approx a list of lower dimensional representations with respect to the original basis
- scores a matrix of scores.
- rss a vector of residual sums of squares.
- modes a list of modes of variation. The rth element of the list is the difference of rank r approximations to rank $r-1$ approximations.
- loadings a matrix of loading vectors.
- center mean of the data

See Also

psa()

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comp_power_pca *Power Transform Principal Component Analysis for PSA Comparison*

Description

A wrapper function of princomp() applied to power transformed data.

Usage

```
comp_power_pca(X, alpha = 1/2)
```

Arguments

X	a data matrix.
alpha	a scalar $alpha > 0$ for power transform.

Value

A list

- pts.approx a list of lower dimensional representations with respect to the original basis
- scores a matrix of scores.
- rss a vector of residual sums of squares.
- modes a list of modes of variation. The rth element of the list is the difference of rank r approximations to rank $r-1$ approximations.
- loadings a matrix of loading vectors.
- center mean of the data

See Also

comp_pca(), psa()

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loading_bar *Loading Bar Plots for PSA*

Description

Creating a bar plot summarizing a loading vector

Usage

```
loading_bar(v, max.k = 12)
```

Arguments

v	a loading vector
max.k	maximum number of elements to display

Value

a ggplot object

plotdendrogram2 *Plot a dendrogram of the merges.*

Description

Converts results to a dendrogram (see stats::as.dendrogram()) object and plots it.

Usage

```
plotdendrogram2(
  result,
  plot = TRUE,
  edge.root = TRUE,
  edgePar = list(p.lty = 0, t.cex = 1, t.adj = c(1, 1)),
  horiz = TRUE,
  nodeheight = "step",
  colors = NULL,
  ...
)
```

Arguments

result	The dendrogram.input value from psa().
plot	logical; if TRUE, plot the dendrogram output.
edge.root	logical; if TRUE, draw an edge to the root node.
edgePar	a list of plotting parameters for edges. See graphics::segments().
horiz	logical; if TRUE, draw the dendrogram horizontally.
nodeheight	a string specifying node height. "step" for heights given by the number of vertices after the merge or "rmse scores" for heights given by the RMSE of the scores of the merge.
colors	a vector of colors of nodes
...	Passed to graphics::plot().

psa *Principal Nested Simplices Analysis*

Description

Estimate PSA-S or PSA-O of given data matrix.

Usage

```
psa(type, X, testweights = seq(0, 1, length.out = 100))
```

Arguments

type	s for PSA-S or o for PSA-O.
X	A data matrix.
testweights	A vector of weights to try.

Value

A list

- vertices a list of matrix representing vertices of the lower dimensional subsimplex. The rth element of the list corresponds to the rank $r-1$ subsimplex.
- pts a list of lower dimensional representations with respect to the reduced basis `vertices`
- pts.approx a list of lower dimensional representations with respect to the original basis
- scores a matrix of scores.
- rss a vector of residual sums of squares.
- modes a list of modes of variation. The rth element of the list is the difference of rank r approximations to rank $r-1$ approximations.
- loadings a matrix of loading vectors.
- const.info a data frame of merged vertices and merging weight at each merge.
- dendrogram.input additional information to apply `plotdendrogram2()`.

See Also

`plotdendrogram2()`

`to_simplex` *Map data to the simplex*

Description

Map data to the simplex while preserving proportions.

Usage

```
to_simplex(X)
```

Arguments

`X`	a data matrix

Value

a matrix of the same dimension as `X`

Index