Package 'biplotbootGUI'

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Type Package

Title Bootstrap on Classical Biplots and Clustering Disjoint Biplot

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Description
A GUI with which the user can construct and interact with Bootstrap methods on Classical Biplots and with Clustering and/or Disjoint Biplot. This GUI is also aimed for estimate any numerical data matrix using the Clustering and Disjoint Principal component (CDPCA) methodology.

License GPL (>= 2)

Depends R (>= 3.1.1)

Imports cluster, dendroextras, graphics, grDevices, MASS, matlib, rgl, shapes, stats, tcltk, tcltk2, tkrplot, utils

SystemRequirements Tcl/Tk package BWidget.

Repository CRAN

NeedsCompilation no

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`biplotbootGUI-package` *biplotbootGUI: Bootstrap on Classical Biplots and Clustering Disjoint Biplot*

Description

The biplotbootGUI package is a graphical user interface to construct and interact with Classical Biplots and, combined with Bootstrap methods, provides confidence intervals based on percentiles, t-bootstrap and BCa to measure the accuracy of the estimators of the parameters given by them.

Details

Package:	biplotbootGUI
Type:	Package
Version:	1.3
Date:	2023-12-11
License:	GPL>=2

Author(s)

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References

- Gabriel, K. R. (1971). The Biplot graphic display of matrices with applications to principal components analysis. Biometrika, 58(3), 453-467.
- Galindo, M. P. (1986). Una alternativa de representacion simultanea: HJ-Biplot. Questiio, 10(1), 13-23.
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- Nieto, A. B., & Galindo, M. P., & Leiva, V., & Vicente-Galindo, P. (2014). A methodology for biplots based on bootstrapping with R. Revista Colombiana de Estadistica, 37(2), 367-397.
- Vichi, M and Saporta, G. (2009). Clustering and disjoint principal component analysis. *Computational Statistics and Data Analysis*, 53, 3194-3208.

Examples

```
data(iris)
biplotboot(iris[,-5])
```

`biplotboot` *biplotbootGUI: Bootstrap on Classical Biplots and Clustering Disjoint Biplot*

Description

The biplotboot function is a graphical user interface to construct and interact with Classical Biplots and, combined with Bootstrap methods, provides confidence intervals based on percentiles and t-bootstrap to measure the accuracy of the estimators of the parameters given by them.

Usage

```
biplotboot(x)
```

Arguments

`x`	A data frame with the information to be analyzed

Details

When the function is launched, firstly, it is necessary to select the number of resamples to be extracted, the conficende level to calculate the intervals presented in the results and the parameters whose inferential form want to be calculated. Then, an option window is displayed where you can change the color, the size, the label and/or the symbol of an element or of a set of elements; to select the kind of Biplot factorization to be applied, to select the transformation data, to change the window size containing the graphs and to tick the checkbox to show the axes in the graph. Press the Graph button and then choose the number of axes to be retained. When the graph will be shown, the function will allow you to change characteristics of the points with the mouse. Press the right mouse button and a window will be displayed to change the color, the size, the label and/or the symbol of the nearest point of position clicked. Press the left mouse button and a window will be displayed to select one option: Change the position label, Remove label or Do nothing. It is also possible to select the dimensions shown in the graph and to change the limits of the axes. In the window there are five menus with their corresponding submenus:

- File
  - Copy image
  - Save image
    - PDF file
    - Eps file
    - Png file
    - Jpg/Jpeg file
  - Exit

- 3D
  - 3D
- Projections
  - Variables
  - Back to original data
- Options
  - Change title
  - Show/Hide axes
- Cluster
  - Hierarchical cluster with biplot coordinates
  - K-means with biplot coordinates
  - K-medoids with biplot coordinates
  - Back to original graph

The File menu provides different options to save the graph and permits to exit the program. The second menu shows the graph in 3 dimensions. The third menu allows the user to project the individuals onto the direction representing one variable selected from a listbox. This menu permits to go back to original graph. The following menu permits to change the title and to show/hide the axes in the graph. The fifth menu allows the user to analyze the biplot coordinates with clustering techniques. The results in an inferential form have saved in a file and together with it graphs with histograms and QQ-plots generated with the bootstrap replications are saved.

Value

A graph showing the data representation, an output file containing the contributions, qualities of representation, goodness of fit, coordinates and eigen values and another output file containing these results in an inferential form.

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References

- Gabriel, K. R. (1971). The Biplot graphic display of matrices with applications to principal components analysis. Biometrika, 58(3), 453-467.
- Galindo, M. P. (1986). Una alternativa de representacion simultanea: HJ-Biplot. Questiio, 10(1), 13-23.
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Examples

```
data(iris)
biplotboot(iris[,-5])
```

`CDBiplot` *Clustering and/or Disjoint Biplot*

Description

The CDBiplot function is a graphical user interface to construct and interact with Clustering and/or Disjoint Biplot.

Usage

```
CDBiplot(data, clase)
```

Arguments

`data`	A data frame with the information to be analyzed
`clase`	A vector containing the real classification of the objects in the data

Details

When the function is launched, firstly, it is necessary to select the kind of analysis to be used on the data. Then, a window to select the number of clusters, components, the tolerance, the number of iterations and the repetitions of the algorithm. Press the OK button and the graph will be shown. Press the left mouse button and a window will be displayed to select one option: Change the position label, Remove label or Do nothing. It is also possible to select the dimensions shown in the graph and to change the limits of the axes. In the window there are four menus:

- File
  - Copy image
  - Save image
    - PDF file
    - Eps file
    - Png file
    - Jpg/Jpeg file
  - Exit
- 3D
  - 3D
- Options
  - Change title
  - Show/Hide axes
  - Show/Hide variables

  - Show/Hide row labels
- Cluster
  - Convex-hull

The File menu provides different options to save the graph and permits to exit the program. The second menu shows the graph in 3 dimensions. The third menu allows the user to change the title and to show/hide the axes, the variables and the row labels in the graph. The last menu permits the user to draw (filled or empty) convex-hull on each cluster. The program saves a file containing the main results of the analysis.

Value

A graph showing the data representation and an output file containing the information about the results.

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References

- Gabriel, K. R. (1971). The Biplot graphic display of matrices with applications to principal components analysis. Biometrika, 58(3), 453-467.
- Galindo, M. P. (1986). Una alternativa de representacion simultanea: HJ-Biplot. Questiio, 10(1), 13-23.
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Examples

```
data(iris)
CDBiplot(iris[,-5], iris[,5])
```

CDpca *Clustering and Disjoint Principal Component Analysis*

Description

CDpca performs a clustering and disjoint principal components analysis (CDPCA) on the given numeric data matrix and returns a list of results Given a (IxJ) real data matrix X = [xij], the CDPCA methodology is allowed to cluster the I objects into P nonempty and nonoverlapping clusters Cp, p = 1,...,P, which are identified by theirs centroids, and, simultaneously, to partitioning the J attributes into Q disjoint components, PCq, q = 1,...,Q. The CDpca function models X estimating the parameter of the model using an Alternating Least Square (ALS) procedure originally proposed by Vichi and Saport (2009) and described in two steps by Macedo and Freitas (2015).

Usage

```
CDpca (data, class=NULL, P, Q, SDPinitial=FALSE, tol= 10^(-5), maxit, r, cdpcaplot=TRUE)
```

Arguments

data	A numeric matrix or data frame which provides the data for the CDPCA
class	A numeric vector containing the real classification of the objects in the data, or NULL if the class of objects is unknown
P	An integer value indicating the number of clusters of objects
Q	An integer value indicating the number of clusters of variables
SDPinitial	A logical value indicating whether the initial assignment matrices U and V are randomly generated (by default) or an algorithmic framework based on a semidefinite programming approach is preferred (TRUE)
tol	A positive (low) value indicating the maximum term for the difference between two consecutives values of the objective function. A tolerance value of 10^(-5) is indicated by default
maxit	The maximum number of iterations of one run of the ALS algorithm
r	Number of runs of the ALS algorithm for the final solution
cdpcaplot	A logical value indicating whether an additional graphic is created (showing the data projected on the first two CDPCA principal components)

Value

Cdpca returns a list of results containing the following components:

Iter	The total number of iterations used in the best loop for computing the best solution
loop	The best loop number
timebestloop	The computation time on the best loop
timeallloops	The computation time for all loops
Y	The component score matrix
Ybar	The object centroids matrix in the reduced space
A	The component loading matrix
U	The partition of objects
V	The partition of variables
F	The value of the objective function to maximize
bcdev	The between cluster deviance
bcdevTotal	The between cluster deviance over the total variability
tableclass	The cdpca classification
pseudocm	The pseudo confusion matrix concerning the true (given by class) and cdpca classifications
Enorm	The error norm for the obtained cdpca model

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References

- Vichi, M and Saporta, G. (2009). Clustering and disjoint principal component analysis. *Computational Statistics and Data Analysis*, 53, 3194-3208.
- Macedo, E. and Freitas, A. (2015). The alternating least-squares algorithm for CDPCA. *Communications in Computer and Information Science (CCIS), Springer Verlag pp. 173-191*.

CDpcaSummary *Clustering and Disjoint Principal Component Analysis Summary*

Description

Produce a list of summary measures to evaluate the result of the CDPCA

Usage

```
CDpcaSummary(obj)
```

Arguments

obj	An object of the type produced by CDpca

Value

CDpcaSummary returns the following values associated to the loop where the best result was produced:

Number of the loops

Number of iterations

Value of the objective function F

Frobenius norm of the error matrix

Between cluster deviance (percentage)

Explained variance by CDpca components (percentage)

Pseudo Confusion Matrix (if available)

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References

- Vichi, M and Saporta, G. (2009). Clustering and disjoint principal component analysis. *Computational Statistics and Data Analysis*, 53, 3194-3208.
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