Package ‘multigroup’

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Imports MASS
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where the same set of variables are measured on different groups of
individuals.
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Between Group Comparison (BGC)

Description

Between Group Comparison (BGC)

Usage

BGC(Data, Group, numc = NULL, ncomp = NULL, Scale = FALSE, graph = FALSE)

Arguments

Data a numeric matrix or data frame
Group a vector of factors associated with group structure
numc number of components associated with PCA on each group
ncomp number of components, if NULL number of components is equal to 2
Scale scaling variables, by default is FALSE. By default data are centered within groups
graph should loading and component be plotted

Value

list with the following results:

Data Original data
Con.Data Concatenated centered data
split.Data Group centered data
Group Group as a factor vector
loadings.common Matrix of common loadings
lambda The specific variances of groups
exp.var Percentages of total variance recovered associated with each dimension
References


See Also

mgPCA, FCPA, DCCSWA, DSTATIS, DGPA, summarize, TBWvariance, loadingsplot, scoreplot, iris

Examples

```r
Data = iris[, -5]
Group = iris[, 5]
res.BGC = BGC(Data, Group, graph=TRUE)
loadingsplot(res.BGC, axes=c(1, 2))
scoreplot(res.BGC, axes=c(1, 2))
```

---

**DCCSWA**

*Dual Common Component and Specific Weights Analysis*

Description

Dual Common Component and Specific Weights Analysis: to find common structure among variables of different groups

Usage

```r
DCCSWA(Data, Group, ncomp = NULL, Scale = FALSE, graph = FALSE)
```

Arguments

- **Data**
  - a numeric matrix or data frame

- **Group**
  - a vector of factors associated with group structure

- **ncomp**
  - number of components, if NULL number of components is equal to 2

- **Scale**
  - scaling variables, by default is FALSE. By default data are centered within groups

- **graph**
  - should loading and component be plotted
Value

list with the following results:

- Data: Original data
- Con.Data: Concatenated centered data
- split.Data: Group centered data
- Group: Group as a factor vector
- loadings.common: Matrix of common loadings
- saliences: Each group having a specific contribution to the determination of this common space, namely the salience, for each dimension under study
- lambda: The specific variances of groups
- exp.var: Percentages of total variance recovered associated with each dimension

References


See Also

- mgPCA, FCPCA, BGC, DSTATIS, DGPA, summarize, TBWvariance, loadingsplot, scoreplot, iris

Examples

```r
Data = iris[,5]
Group = iris[,5]
res.DCCSWA = DCCSWA(Data, Group, graph=TRUE)
loadingsplot(res.DCCSWA, axes=c(1,2))
scoreplot(res.DCCSWA, axes=c(1,2))
```

---

**DGPA**

*Dual Generalized Procrustes Analysis*

**Description**

Dual Generalized Procrustes Analysis to study multigroup data

**Usage**

```
DGPA(Data, Group, ncomp = NULL, Scale = FALSE, graph = FALSE)
```
DGPA

Arguments

- **Data**: a numeric matrix or data frame
- **Group**: a vector of factors associated with group structure
- **ncomp**: number of components, if NULL number of components is equal to 2
- **Scale**: scaling variables, by default is FALSE. By default data are centered within groups
- **graph**: should loading and component be plotted

Value

list with the following results:

- **Data**: Original data
- **Con.Data**: Concatenated centered data
- **split.Data**: Group centered data
- **Group**: Group as a factor vector
- **loadings.common**: Matrix of common loadings
- **lambda**: The specific variances of groups
- **exp.var**: Percentages of total variance recovered associated with each dimension

References


See Also

- mgPCA, FPCA, DCCSWA, DSTATIS, BGC, summarize, TBWvariance, loadingsplot, scoreplot, iris

Examples

```r
Data = iris[,5]
Group = iris[,5]
res.DGPA = DGPA(Data, Group, graph=TRUE)
loadingsplot(res.DGPA, axes=c(1,2))
scoreplot(res.DGPA, axes=c(1,2))
```
DSTATIS

Dual STATIS

Description

Dual STATIS

Usage

DSTATIS(Data, Group, ncomp = NULL, Scale = FALSE, graph = FALSE)

Arguments

Data a numeric matrix or data frame
Group a vector of factors associated with group structure
ncomp number of components, if NULL number of components is equal to 2
Scale scaling variables, by default is False. By default data are centered within groups.
graph should loading and component be plotted

Value

list with the following results:

Data original data
Con.Data Concatenated centered data
split.Data Group centered data
Group Group as a factor vector
RV The RV coefficient matrix
weights Vector of weights
compromise.matrix Compromise variance-covariance matrix
loadings.common Matrix of common loadings
lambda The specific variances of group

References

FCPCA

See Also

mgPCA, FCPA, DCCSWA, BGC, DGPA, summarize, TBWvariance, loadingsplot, scoreplot, iris

Examples

Data = iris[,-5]
Group = iris[,5]
res.DSTATIS = DSTATIS(Data, Group, graph=TRUE)
loadingsplot(res.DSTATIS, axes=c(1,2))
scoreplot(res.DSTATIS, axes=c(1,2))

---

FCPCA

Flury's Common Principal Component Analysis

Description

Common principal component Analysis

Usage

FCPCA(Data, Group, Scale = FALSE, graph = FALSE)

Arguments

Data a numeric matrix or data frame
Group a vector of factors associated with group structure
Scale scaling variables, by default is False. By default data are centered within groups.
graph should loading and component be plotted

Value

list with the following results:

Data Original data
Con.Data Concatenated centered data
split.Data Group centered data
Group Group as a factor vector
loadings.common Matrix of common loadings
lambda The specific variances of group
exp.var Percentages of total variance recovered associated with each dimension
References


See Also

*mgPCA, DGPA, DCCSWA, DSTATIS, BG, summarize, TBVariance, loadingsplot, scoreplot, iris*

Examples

```r
Data = iris[, -5]
Group = iris[, 5]
res.FCP = FCPCA(Data, Group, graph=TRUE)
loadingsplot(res.FCP, axes=c(1,2))
scoreplot(res.FCP, axes=c(1,2))
```

loadingsplot loadings plot

Description

plots of variables (loadings)

Usage

```r
loadingsplot(x, axes = c(1, 2), INERTIE = NULL, cex = NULL, font.lab = NULL)
```

Arguments

- `x`: results of the proposed multigroup methods in the package
- `axes`: a vector of two selected components
- `INERTIE`: if there is information about inertia
- `cex`: character expansion for text by default .85
- `font.lab`: type of font by default 3

Value

loadings plot

Examples

```r
Data = iris[, -5]
Group = iris[, 5]
res.mgPCA = mgPCA (Data, Group, graph=TRUE)
loadingsplot(res.mgPCA, axes=c(1,2))
```
loadingsplotXY

loadings plot of X and Y

Description
plots of variables (loadings)

Usage
loadingsplotXY(X, Y, axes = c(1, 2), INERTIE = NULL, cex = NULL,
font.lab = NULL)

Arguments
X    common loadings associated with X
Y    common loadings associated with Y
axes a vector of two selected components
INERTIE if there is information about inertia
cex character expansion for text by default .85
font.lab type of font by default 3

Value
loadings plot

Examples
data(oliveoil)
DataX = oliveoil[,2:6]
DataY = oliveoil[,7:12]
Group = as.factor(oliveoil[,1])
res.mgPLS = mgPLS (DataX, DataY, Group)
X=res.mgPLS$loadings.commo$X; Y=res.mgPLS$loadings.commo$Y
loadingsplotXY(X, Y, axes=c(1,2), INERTIE=res.mgPLS$noncumper.inertiglobal)

mbmgPCA

multiblock and multigroup Principal Component Analysis

Description
multiblock and multigroup PCA (mbmgPCA)
Usage

mbmgPCA(Data, Group, nBlock, Block.name = NULL, ncomp = NULL, niter = NULL, ScaleGroup = FALSE, ScaleDataA = FALSE, ScaleDataB = FALSE, norm = FALSE)

Arguments

Data         a numeric (quantitative) matrix or data frame
Group        a vector of factors associated with group structure
nBlock       a vector of number of variables in each block
Block.name   vector of name of blocks
ncomp        number of components, if NULL number of components is equal to min(rank(Data), M-1)
niter        number of iteration, if NULL number of iteration is equal to 10
ScaleGroup   scaling variables in each group and block, by default is FALSE
ScaleDataA   scaling variables in each block after group preprocessing, by default is FALSE
ScaleDataB   scaling variables in each block before group preprocessing, by default is FALSE
norm         normalize each block, by default is FALSE

Value

list with the following results:

K.Data    Block data
concat.Data Concatenated data
concat.block.Data Block concatenated data
res.iter   Result of iteration
CRIT.h     Maximization criterion for each dimension
CRIT       Maximization criterion
crit.group Maximization criterion associated with each group
crit.block Maximization criterion associated with each block
omega      Weight of each block in construction of common scores
block.common.loadings Common loadings for each block
block.group.loadings Partial loadings for each block and group
similarity Similarity among common and partial loadings for each block
global.scores Global scores among blocks
block.scores Scores for each block
block.group.scores Scores for each block and group
Multigroup Principal Component Analysis

Description

Multigroup PCA algorithm (NIPALS for Multigroup PCA)

Usage

`mgPCA(Data, Group, ncomp = NULL, Scale = FALSE, graph = FALSE)`

Arguments

- **Data**: a numeric matrix or data frame
- **Group**: a vector of factors associated with group structure
- **ncomp**: number of components, if NULL number of components is equal to 2
- **Scale**: scaling variables, by default is FALSE. By default data are centered within groups
- **graph**: should loading and component be plotted

Examples

```r
data(wine)
Select = c(which(wine[,2] == "Env1"), which(wine[,2] == "Env2"), which(wine[,2] == "Reference"))
WineData = wine[Select, -c(1, 2)]
Group <- as.factor(c(rep("Env1", 7), rep("Env2", 5), rep("Reference", 7)))
nBlock <- c(5, 3, 10, 9)
BlockNames <- c("Olfaction at rest", "Vision", "Olfaction after shaking", "Taste")
res = mbmgpca(Data = WineData, Group, nBlock, ncomp = 5)
```
Value

list with the following results:

Data          Original data
Con.Data      Concatenated centered data
split.Data    Group centered data
Group         Group as a factor vector
loadings.group Loadings associated with each group
score.group   Scores associated with each group
loadings.common Matrix of common loadings
score.Global  Global scores
cumper.inertigroup Cumulative percentage of group components inertia
cumper.inertiglobal Cumulative percentage of global component inertia
noncumper.inertiglobal Percentage of global component inertia
lambda        The specific variances of groups
exp.var       Percentages of total variance recovered associated with each dimension
Similarity.Common.Group.load  Cumulative similarity between group and common loadings
Similarity.noncum.Common.Group.load  NonCumulative similarity between group and common loadings

References


See Also

BGC, FCPA, DCCSWA, DSTATIS, DGPA, summarize, TBWvariance, loadingsplot, scoreplot, iris

Examples

```r
Data = iris[,,-5]
Group = iris[,5]
res.mgPCA = mgPCA (Data, Group)
barplot(res.mgPCA$noncumper.inertiglobal)
#-------------------
#Similarity index: group loadings are compared to the common structure (first dimension)
Xzero = rep(0, 3)
MIN = min(res.mgPCA$Similarity.noncum.Common.Group.load[[1]][-1, 1])-0.0005
```
mgPLS

Multigroup Partial Least Squares Regression

Description

Multigroup PLS regression

Usage

mgPLS(DataX, DataY, Group, ncomp = NULL, Scale = FALSE, Gcenter = FALSE, Gscale = FALSE)

Arguments

DataX  a numeric matrix or data frame associated with independent dataset
DataY  a numeric matrix or data frame associated with dependent dataset
Group  a vector of factors associated with group structure
ncomp  number of components, if NULL number of components is equal to 2
Scale  scaling variables, by default is FALSE. By default data are centered within groups
Gcenter global variables centering, by default is FALSE.
Gscale global variables scaling, by default is FALSE.

Value

list with the following results:

DataXm  Group X data
DataYm  Group Y data
### References


### See Also

`mgPCA`, `mbmgPCA`

### Examples

```r
data(oliveoil)
DataX = oliveoil[,2:6]
DataY = oliveoil[,7:12]
Group = as.factor(oliveoil[,1])
res.mgPLS = mgpls(DataX, DataY, Group)
barplot(res.mgPLS$cum.expvar$Group)
#-----  Regression coefficients
res.mgPLS$coefficients[,2]
#-----  Similarity index: group loadings are compared to the common structure (in X and Y spaces)
XX1= res.mgPLS$similarity.noncum.Common.Group.load$X$[1][-1, 1, drop=FALSE]
```
multigroup

This package includes several methods to study multigroup data, where the same set of variables are measured on different groups of individuals.

Some Functions

- **BGC**: Between Group Comparison
- **DCCSWA**: Dual Common Component and Specific Weights Analysis
- **DGPA**: Dual Generalized Procrustes Analysis
- **DSTATIS**: Dual STATIS
- **FCPCA**: Flury’s Common Principal Component Analysis
- **mgPCA**: Multigroup Principal Component Analysis
- **mgPLS**: Multigroup Partial Least Squares Regression
- **mbmgPCA**: Multiblock and multigroup PCA
oliveoil  Sensory and physico-chemical data of olive oils

Description
A data set with scores on 6 attributes from a sensory panel and measurements of 5 physico-chemical quality parameters on 16 olive oil samples. The first five oils are Greek, the next five are Italian and the last six are Spanish (Package pls).

Usage
data(oliveoil)

Format
A data frame with 16 observations on the following 2 variables. sensory a matrix with 6 columns. Scores for attributes yellow, green, brown, glossy, transp, and syrup. chemical a matrix with 5 columns. Measurements of acidity, peroxide, K232, K270, and DK (Package pls).

Source
Package pls

plot.mg  Plots for multigroup objects

Description
plots of variables (loadings) and individuals (scores) if TRUE

Usage
## S3 method for class 'mg'
plot(x, axes = c(1, 2), cex = NULL, font.lab = NULL, ...)

Arguments
x  results of multigroup method in the package
axes  by default the first two components
cex  character expansion for text by default .85
font.lab  type of font by default 3
...  Further arguments are ignored

Value
loadings and scores plots
scoreplot

Score plot for multigroup data

Description
plots of individuals

Usage
scoreplot(x, axes = c(1, 2), cex = NULL, font.lab = NULL)

Arguments
- x: results of the proposed multigroup methods in the package
- axes: a vector of two selected components
- cex: character expansion for text by default .85
- font.lab: type of font by default 3

Value
score plot

Examples
Data = iris[, -5]
Group = iris[, 5]
res.mgPCA = mgPCA(Data, Group, graph=TRUE)
scoreplot(res.mgPCA, axes=c(1,2))

summarize
Summary

Description
Summary of multigroup data in global and group parts

Usage
summarize(Data, Group)

Arguments
- Data: a numeric matrix or data frame
- Group: a vector of factors associated with group structure
Value
list with the following results:

- Global.summary: summary of global data
- Group.summary: summary of group datasets
- mean.between.data: matrix of Group mean
- mean.within.data: matrix of group centered data

See Also
mgPCA, DGPA, DCSSWA, DSTATIS, BGC, TBWvariance, iris

Examples
```
Data = iris[,,-5]
Group = iris[,5]
res = summarize(Data, Group)
```

Description
Calculation of total, within- and between-group variance-covariance matrices

Usage
```
TBWvariance(Data, Group)
```

Arguments
- Data: a numeric matrix or data frame
- Group: a vector of factors associated with group structure

Value
list with the following results:

- Within.Var: within-group variance-covariance matrix
- Between.Var: between-group variance-covariance matrix
- Total.Var: total variance-covariance matrix
- Between.per: Within-group variance percentage
- Between.per: Between-group variance percentage
References

See Also
mgPCA, DGPA, DCCSWA, DSTATIS, BGC, summarize, iris

Examples
Data = iris[, -5]
Group = iris[, 5]
res = TBWvariance(Data, Group)

---

wine  Wine data

Description
The data used here refer to 21 wines of Val de Loire.

Usage
data(wine)

Format
A data frame with 21 rows (the number of wines) and 31 columns: the first column corresponds to the label of origin, the second column corresponds to the soil, and the others correspond to sensory descriptors.

Source
Centre de recherche INRA d’Angers, Package FactoMineR
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