

# Package ‘MBAnalysis’

October 12, 2022

**Title** Multiblock Exploratory and Predictive Data Analysis

**Version** 0.1.0

**Date** 2021-09-18

**Description** Exploratory and predictive methods for the analysis of several blocks of variables measured on the same individuals. The methods included are: Multiblock Principal Components Analysis (MB-PCA), Common Dimensions analysis (ComDim), Multiblock Partial Least Squares (MB-PLS) regression and Multiblock Weighted Covariate analysis (MB-WCov). E. Tchandao Mangamana, V. Cariou, E. Vigneau, R. Glèlè Kakai, E.M. Qannari (2019) <[doi:10.1016/j.chemolab.2019.103856](https://doi.org/10.1016/j.chemolab.2019.103856)>; E. Tchandao Mangamana, R. Glèlè Kakai, E.M. Qannari (2021) <[doi:10.1016/j.chemolab.2021.104388](https://doi.org/10.1016/j.chemolab.2021.104388)>.

**Imports** ggplot2, ggrepel

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.1

**NeedsCompilation** no

**Author** Essomanda Tchandao Mangamana [aut, cre],  
Véronique Cariou [aut],  
Evelyne Vigneau [aut]

**Maintainer** Essomanda Tchandao Mangamana <tchanesso@yahoo.fr>

**Repository** CRAN

**Date/Publication** 2021-09-20 09:30:06 UTC

## R topics documented:

ComDim	2
ham	4
MBPCA	5
MBPLS	7
MBWCov	9
plot.ComDim	12

plot.MBPCA . . . . .	14
plot.MBPLS . . . . .	16
plot.MBWcov . . . . .	18
print.ComDim . . . . .	20
print.MBPCA . . . . .	22
print.MBPLS . . . . .	23
print.MBWcov . . . . .	24
summary.ComDim . . . . .	26
summary.MBPCA . . . . .	27
summary.MBPLS . . . . .	28
summary.MBWcov . . . . .	29

<b>Index</b>	<b>30</b>
--------------	-----------

---

ComDim	<i>Common Dimensions analysis (ComDim)</i>
--------	--

---

## Description

ComDim applied to a set of quantitative blocks of variables.

## Usage

```
ComDim(
  X,
  group,
  algo = "eigen",
  ncompprint = NULL,
  scale = "none",
  option = "uniform",
  nstart = 10,
  threshold = 1e-08,
  plotgraph = TRUE,
  axes = c(1, 2)
)
```

## Arguments

X	Block obtained by horizontally merging all the blocks of variables.
group	Vector indicating the number of variables per block.
algo	Type of algorithm to use. Either "eigen" (default) or "nipals".
ncompprint	Number of global components to print. By default (NULL), all the global components of the analysis are printed.
scale	Type of standardization applied to the variables. Either "none" (default) or "sd". If scale="sd", each variable is divided by its standard deviation.

option	Type of normalization applied to each block of variables (either "none" or "uniform"). If option="uniform" (default), each block of variables is divided by its Frobenius norm.
nstart	Number of random initializations of the global component in case of nipals algorithm (by default 10).
threshold	Value used to break the iterative loop (by default 1e-8).
plotgraph	Boolean (TRUE/FALSE). If TRUE (default), graphs depicting saliences, scores of individuals, correlations of variables with the global components and contributions of blocks of variables to the determination of global components are displayed.
axes	Vector of length two which specifies the global components to plot (by default the first two).

### Value

Returns a list of the following elements:

components : Numeric vector of length two that indicates the number of global components of the analysis and the number of global components to print.

optimalcrit : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

cumexplained : Two columns matrix of percentages of total inertia of the blocks of variables explained by the successive global components and their cumulative values.

explained.X : Matrix of percentages of inertia explained for each Xb block.

saliences : Matrix containing the specific weights of different blocks of variables on global components.

contrib : Matrix of contribution of each Xb block to the determination of global components.

T : Matrix of global components (scores of individuals).

C : Compromise matrix (unnormed global components).

globalcor : Matrix of correlation coefficients between the original variables and the global components.

cor.g.b : Array that gives the correlation of the global components with their respective block components.

Block : Results associated with each block of variables.

- T.b : Array that contains the matrices of block components.
- blockcor : List of matrices of correlation coefficients between the original variables of each block and the block components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

## References

E.M. Qannari, I. Wakeling, P. Courcoux, J.M. MacFie (2000). Defining the underlying sensory dimensions, *Food Quality and Preference*, 11: 151-154.

E. Tchandao Mangamana, V. Cariou, E. Vigneau, R. Glèlè Kakaï, E.M. Qannari (2019). Unsupervised multiblock data analysis: A unified approach and extensions, *Chemometrics and Intelligent Laboratory Systems*, 194, 103856.

## See Also

[print.ComDim plot.ComDim summary.ComDim](#)

## Examples

```
data(ham)
X=ham$X
group=ham$group
res.comdim <- ComDim(X, group)
res.comdim
```

---

ham

*Ham data*

---

## Description

Case study pertaining to the sensory evaluation of eight American dry-cured ham products, performed by a panel of trained assessors.

## Usage

```
data(ham)
```

## Format

An object of class "list" with 8 products, 3 blocks of X variables (Flavor, Aroma, Texture) and 1 block of Y variables corresponding to hedonic measures:

**X** dataframe of 8 products and 25 variables structured into 3 blocks: Flavor (11 variables), Aroma (8 variables) and Texture (6 variables)

**Y** dataframe of 8 products and 6 vectors of hedonic values corresponding to consumers' segmentation

**group** vector indicating the number of variables per block

## References

M.D. Guardia, A.P. Aguiar, A. Claret, J. Arnau & L. Guerrero (2010). Sensory characterization of dry-cured ham using free-choice profiling. *Food Quality and Preference*, 21(1), 148-155. doi: [10.1016/j.foodqual.2009.08.014](https://doi.org/10.1016/j.foodqual.2009.08.014)

**Examples**

```
data(ham)
ham$X
ham$Y
ham$group
```

---

 MBPCA

---

*Multiblock Principal Components Analysis (MB-PCA)*


---

**Description**

Performs MB-PCA on a set of quantitative blocks of variables.

**Usage**

```
MBPCA(
  X,
  group,
  algo = "eigen",
  ncompprint = NULL,
  scale = "none",
  option = "uniform",
  nstart = 10,
  threshold = 1e-08,
  plotgraph = TRUE,
  axes = c(1, 2)
)
```

**Arguments**

X	Block obtained by horizontally merging all the blocks of variables.
group	Vector which indicates the number of variables in each block.
algo	Type of algorithm to use. Either "eigen" (default) or "nipals".
ncompprint	Number of global components to print. By default (NULL), all the global components of the analysis are printed.
scale	Type of standardization applied to the variables. Either "none" (default) or "sd". If scale="sd", each variable is divided by its standard deviation.
option	Type of normalization applied to each block of variables (either "none" or "uniform"). If option="uniform" (default), each block of variables is divided by its Frobenius norm.
nstart	Number of random initializations of the global component in case of nipals algorithm (by default 10).
threshold	Value used to break the iterative loop (by default 1e-8).

plotgraph	Boolean (TRUE/FALSE). If TRUE (default), graphs depicting scores of individuals, correlations of variables with the global components and contributions of blocks of variables to the determination of global components are displayed.
axes	Vector of length two which specifies the global components to plot (by default the first two).

### Value

Returns a list of the following elements:

components : Numeric vector of length two that indicates the number of global components of the analysis and the number of global components to print.

optimalcrit : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

cumexplained : Two columns matrix of percentages of total inertia of the blocks of variables explained by the successive global components and their cumulative values.

explained.X : Matrix of percentages of inertia explained in each Xb block.

contrib : Matrix of contribution of each Xb block to the determination of global components.

T : Matrix of global components (scores of individuals).

C : Compromise matrix (unnormed global components).

globalcor : Matrix of correlation coefficients between variables and global components.

cor.g.b : Array that gives the correlation of the global components with their respective block components.

Block : Results associated with each block Xb.

- T.b : Array that contains the matrices of block components.
- blockcor : List of matrices of correlation coefficients between the original variables of each block and the block components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### References

S. Wold, S. Hellberg, T. Lundstedt, M. Sjostrom, H. Wold (1987). Hierarchical multiblock PLS and PC models for easier model interpretation and as an alternative to variable selection, in: Proc. Symp. On PLS Model Building: Theory and Application, Frankfurt am Main.

E. Tchandao Mangamana, V. Cariou, E. Vigneau, R. Glèlè Kakai, E.M. Qannari (2019). Unsupervised multiblock data analysis: A unified approach and extensions, Chemometrics and Intelligent Laboratory Systems, 194, 103856.

**See Also**

[print.MBPCA](#) [plot.MBPCA](#) [summary.MBPCA](#)

**Examples**

```
data(ham)
X=ham$X
group=ham$group
res.mbpca <- MBPCA(X, group)
res.mbpca
```

---

MBPLS

*Multiblock Partial Least Squares (MB-PLS) regression*

---

**Description**

MB-PLS regression applied to a set of quantitative blocks of variables.

**Usage**

```
MBPLS(
  X,
  Y,
  group,
  algo = "eigen",
  ncompprint = NULL,
  scale = "none",
  scaleY = "none",
  option = "uniform",
  optionY = "uniform",
  nstart = 10,
  threshold = 1e-08,
  plotgraph = TRUE,
  axes = c(1, 2)
)
```

**Arguments**

X	Block obtained by horizontally merging all the explanatory blocks of variables.
Y	Response block of variables.
group	Vector indicating the number of variables in each explanatory block.
algo	Type of algorithm to use. Either "eigen" (default) or "nipals".
ncompprint	Number of global components to print. By default (NULL), all the global components of the analysis are printed.

scale	Type of standardization applied to the variables in the explanatory blocks. Either "none" (default) or "sd". If scale="sd", each variable in the explanatory blocks is divided by its standard deviation.
scaleY	Type of standardization applied to the variables in the response block. Either "none" (default) or "sd". If scaleY="sd", each variable in the response block is divided by its standard deviation.
option	Type of normalization applied to each explanatory block of variables (either "none" or "uniform"). If option="uniform" (default), each explanatory block of variables is divided by its Frobenius norm.
optionY	Type of normalization applied to the response block of variables (either "none" or "uniform"). If optionY="uniform" (default), the response block of variables is divided by its Frobenius norm.
nstart	Number of random initializations of the vector of Y loadings in case of nipals algorithm (by default 10).
threshold	Value used to break the iterative loop (by default 1e-8).
plotgraph	Boolean (TRUE/FALSE). If TRUE (default), graphs depicting scores of individuals, correlations of variables with the global components and contributions of blocks of variables to the determination of global components are displayed.
axes	Vector that indicates the plane in which graphs should be depicted (by default the plane formed by the first two global components).

### Value

Returns a list of the following elements:

components : Numeric vector of length two that gives the number of global components of the analysis and the number of global components to print.

optimalcrit : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

cumexplained : Four columns matrix of percentages of total inertia of the explanatory blocks, percentages of inertia of the response block explained by the successive global components and their cumulative values.

explained.X : Matrix of percentages of inertia explained for each Xb block.

explained.Y : Matrix of percentages of inertia explained for each Y variable.

contrib : Matrix of contribution of each Xb block to the determination of global components.

T : Matrix of global components (scores of individuals).

C : Compromise matrix (unnormed global components).

U : Matrix of components associated with the response block of variables.

globalcor : Matrix of correlation coefficients between the original variables and the global components.

cor.g.b : Array that gives the correlation of the global components with their respective block components.

betaY : Array of regression coefficients.



- Block : Results associated with each block of variables.
- T.b : Array that contains the matrices of block components.
  - blockcor : List of matrices of correlation coefficients between the original variables of each block of variables and the block components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### References

S. Wold (1984). Three PLS algorithms according to SW. In: Symposium MULDAST (Multivariate Analysis in Science and Technology), Umea University, Sweden. pp. 26–30.

E. Tchandao Mangamana, R. Glèlè Kakaï, E.M. Qannari (2021). A general strategy for setting up supervised methods of multiblock data analysis. *Chemometrics and Intelligent Laboratory Systems*, 217, 104388.

### See Also

[print.MBPLS](#) [plot.MBPLS](#) [summary.MBPLS](#)

### Examples

```
data(ham)
X=ham$X
group=ham$group
Y=ham$Y
res.mbpls <- MBPLS(X, Y, group)
res.mbpls
```

---

MBWCov

*Multiblock Weighted Covariate analysis (MB-WCov)*

---

### Description

MB-WCov applied to multiblock quantitative variables.

### Usage

```
MBWCov(
  X,
  Y,
  group,
  algo = "eigen",
  ncompprint = NULL,
```

```

scale = "none",
scaleY = "none",
option = "uniform",
optionY = "uniform",
nstart = 10,
threshold = 1e-08,
plotgraph = TRUE,
axes = c(1, 2)
)

```

### Arguments

X	Block obtained by horizontally merging all the explanatory blocks of variables.
Y	Response block of variables.
group	Vector indicating the number of variables in each explanatory block.
algo	Type of algorithm to use. Either "eigen" (default) or "nipals".
ncompprint	Number of global components to print. By default (NULL), all the global components of the analysis are printed.
scale	Type of standardization applied to the variables in the explanatory blocks. Either "none" (default) or "sd". If scale="sd", each variable in the explanatory blocks is divided by its standard deviation.
scaleY	Type of standardization applied to the variables in the response block. Either "none" (default) or "sd". If scaleY="sd", each variable of the response block is divided by its standard deviation.
option	Type of normalization applied to each explanatory block of variables (either "none" or "uniform"). If option="uniform" (default), each explanatory block of variables is divided by its Frobenius norm.
optionY	Type of normalization applied to the response block of variables (either "none" or "uniform"). If optionY="uniform" (default), the response block of variables is divided by its Frobenius norm.
nstart	Number of random initializations of the vector of Y loadings in case of nipals algorithm (by default 10).
threshold	Value used to break the iterative loop (by default 1e-8).
plotgraph	Boolean (TRUE/FALSE). If TRUE (default), graphs depicting saliences, scores of individuals, correlations of variables with the global components and contributions of blocks of variables to the determination of global components are displayed.
axes	Vector that indicates the plane in which graphs should be depicted (by default the plane formed by the first two global components).

### Value

Returns a list of the following elements:

components : Numeric vector of length two that gives the number of global components of the analysis and the number of global components to print.

optimalcrit : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

cumexplained : Four columns matrix of percentages of total inertia of the explanatory blocks, percentages of inertia of the response block explained by the successive global components and their cumulative values.

explained.X : Matrix of percentages of inertia explained for each Xb block.

explained.Y : Matrix of percentages of inertia explained for each Y variable.

saliences : Matrix containing the specific weights of each explanatory block of variables on global components.

contrib : Matrix of contribution of each Xb block to the determination of global components.

T : Matrix of global components (scores of individuals).

C : Compromise matrix (unnormed global components).

U : Matrix of components associated with the response block of variables.

globalcor : Matrix of correlation coefficients between the original variables and the global components.

cor.g.b : Array that gives the correlation of the global components with their respective block components.

betaY : Array of regression coefficients.

Block : Results associated with each block of variables.

- T.b : Array that contains the matrices of block components.
- blockcor : List of matrices of correlation coefficients between the original variables of each block of variables and the block components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### References

E. Tchanda Mangamana, R. Glèlè Kakaï, E.M. Qannari (2021). A general strategy for setting up supervised methods of multiblock data analysis. *Chemometrics and Intelligent Laboratory Systems*, 217, 104388.

### See Also

[print.MBWCov](#) [plot.MBWCov](#) [summary.MBWCov](#)

**Examples**

```

data(ham)
X=ham$X
group=ham$group
Y=ham$Y
res.mbwcov <- MBWCov(X, Y, group)
res.mbwcov

```

---

plot.ComDim

*Main Graphs for Common Dimensions analysis (ComDim)*


---

**Description**

Plot the main graphs for ComDim.

**Usage**

```

## S3 method for class 'ComDim'
plot(
  x,
  axes = c(1, 2),
  graphtype = c("saliences", "globalscores", "blockscores", "globalcor", "blockcor",
    "expl", "cumexpl", "crit", "contrib"),
  select = NULL,
  max.overlaps = 20,
  xlim = NULL,
  ylim = NULL,
  title = NULL,
  color = NULL,
  ...
)

```

**Arguments**

x	An object of class ComDim.
axes	A vector of length two which specifies the global components to plot (by default the first two).
graphtype	Type of graph to plot. Either "saliences", "globalscores", "blockscores", "globalcor", "blockcor", "expl", "cumexpl", "crit" or "contrib". Refer to the details section.
select	Selection of elements to plot. By default (NULL), all the elements are plotted. Refer to the details section.
max.overlaps	Exclude text labels that overlap too many things (by default, 20).
xlim	Range for the plotted 'x' values.
ylim	Range for the plotted 'y' values.

title	Title of the graph to draw.
color	Color for the plot.
...	Further arguments.

### Details

The explanation of the arguments `graphtype` and `select` is as follow.

If `graphtype="salience"`, the relationships between blocks of variables are shown.

If `select=NULL`, all the blocks are shown, otherwise, only the selected ones are shown.

If `graphtype="globalscores"`, individuals are projected on the space formed by the global components.

In this case, if for example, `select=NULL`, all the individuals are plotted. However, if `select=5`, only the first five individuals are plotted.

If `graphtype="blockscores"`, individuals are projected on the space formed by the block components.

If `select=NULL`, individuals of each block are plotted on separate figures.

If `select=c(1,3)`, individuals of blocks 1 and 3 are plotted on separate figures.

If `graphtype="globalcor"`, correlations of original variables with the global components are depicted.

If `select=NULL`, correlations of the variables of all the blocks are plotted on the same figure.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="blockcor"`, correlations of original variables with the block components are depicted.

If `select=NULL`, correlations of the variables of each block are plotted on separate figures.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="expl"`, percentages of inertia of all the blocks explained by the global components are drawn.

If `graphtype="cumexpl"`, cumulative percentages of inertia of all the blocks explained by the global components are drawn.

`graphtype="crit"` plots the values of the maximization criterion.

`graphtype="contrib"` depicts the contribution of each block of variables to the determination of the global components.

For `graphtype="expl"`, `"cumexpl"`, `"crit"` and `"contrib"`, if `select=NULL`, all the dimensions are plotted.

But if for example, `select=5`, only the first five dimensions are plotted.

### Value

Returns graphs showing the relationships between blocks of variables, projection of individuals in both global and block components, the correlations of variables with the global and block components, the percentages of inertia explained by the global components and their cumulative values, the values of the maximization criterion and the contributions of the blocks to the determination of global components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**[ComDim](#)**Examples**

```

data(ham)
X=ham$X
group=ham$group
res.comdim <- ComDim(X, group, plotgraph=FALSE)
plot(res.comdim, graphtype="salience")
plot(res.comdim, graphtype="globalcor")

```

---

plot.MBPCA	<i>Main Graphs for Multiblock Principal Components Analysis (MB-PCA)</i>
------------	--

---

**Description**

Plot the main graphs for MB-PCA.

**Usage**

```

## S3 method for class 'MBPCA'
plot(
  x,
  axes = c(1, 2),
  graphtype = c("globalscores", "blockscores", "globalcor", "blockcor", "expl",
    "cumexpl", "crit", "contrib"),
  select = NULL,
  max.overlaps = 20,
  xlim = NULL,
  ylim = NULL,
  title = NULL,
  color = NULL,
  ...
)

```

**Arguments**

x	An object of class MBPCA.
axes	A vector of length two which specifies the global components to plot (by default the first two).
graphtype	Type of graph to plot. Either "globalscores", "blockscores", "globalcor", "blockcor", "expl", "cumexpl", "crit" or "contrib". Refer to the details section.
select	Selection of elements to plot (by default, select=NULL). Refer to the details section.

max.overlaps	Exclude text labels that overlap too many things (by default, 20).
xlim	Range for the plotted 'x' values.
ylim	Range for the plotted 'y' values.
title	Title of the graph to draw.
color	Color for the plot.
...	Further arguments.

### Details

The arguments `graphtype` and `select` are used as follow.

If `graphtype="globalscores"`, individuals are projected on the space formed by the global components.

In this case, if for example, `select=NULL`, all the individuals are plotted. However, if `select=5`, only the first five individuals are plotted.

If `graphtype="blockscores"`, individuals are projected on the space formed by the block components.

If `select=NULL`, individuals of each block are plotted on separate figures.

If `select=c(1,3)`, individuals of blocks 1 and 3 are plotted on separate figures.

If `graphtype="globalcor"`, correlations of original variables with the global components are depicted.

If `select=NULL`, correlations of the variables of all the blocks are plotted on the same figure.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="blockcor"`, correlations of original variables with the block components are depicted.

If `select=NULL`, correlations of the variables of each block are plotted on separate figures.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="expl"`, percentages of inertia of all the blocks explained by the global components are drawn.

If `graphtype="cumexpl"`, cumulative percentages of inertia of all the blocks explained by the global components are drawn.

`graphtype="crit"` plots the values of the maximization criterion.

`graphtype="contrib"` depicts the contribution of each block of variables to the determination of the global components.

For `graphtype="expl"`, `"cumexpl"`, `"crit"` and `"contrib"`, if `select=NULL`, all the dimensions are plotted.

But if for example, `select=5`, only the first five dimensions are plotted.

### Value

Returns graphs showing the projection of individuals in both global and block components, the correlations of variables with the global and block components, the percentages of inertia explained by the global components and their cumulative values, the values of the maximization criterion and the contributions of the blocks to the determination of global components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**[MBPCA](#)**Examples**

```
data(ham)
X=ham$X
group=ham$group
res.mbpca <- MBPCA(X, group, plotgraph=FALSE)
plot(res.mbpca, graphtype="globalscores")
```

---

plot.MBPLS	<i>Main Graphs for Multiblock Partial Least Squares (MB-PLS) regression</i>
------------	---

---

**Description**

Plot the main graphs for MB-PLS regression.

**Usage**

```
## S3 method for class 'MBPLS'
plot(
  x,
  axes = c(1, 2),
  graphtype = c("globalscores", "blockscores", "globalcor", "blockcor", "explY",
    "cumexplY", "explX", "cumexplX", "crit", "contrib"),
  select = NULL,
  max.overlaps = 20,
  xlim = NULL,
  ylim = NULL,
  title = NULL,
  color = NULL,
  ...
)
```

**Arguments**

x	An object of class MBPLS.
axes	A vector of length two which specifies the global components to plot (by default the first two).
graphtype	Type of graph to plot. Either "globalscores", "blockscores", "globalcor", "blockcor", "explY", "cumexplY", "explX", "cumexplX", "crit" or "contrib". Refer to the details section.
select	Selection of elements to plot (by default, select=NULL). Refer to the details section.



max.overlaps	Exclude text labels that overlap too many things (by default, 20).
xlim	Range for the plotted 'x' values.
ylim	Range for the plotted 'y' values.
title	Title of the graph to draw.
color	Color for the plot.
...	Further arguments.

### Details

The arguments `graphtype` and `select` are used as follow.

If `graphtype="globalscores"`, individuals are projected on the space formed by the global components.

In this case, if for example, `select=NULL`, all the individuals are plotted. However, if `select=5`, only the first five individuals are plotted.

If `graphtype="blockscores"`, individuals are projected on the space formed by the block components.

If `select=NULL`, individuals of each block are plotted on separate figures.

If `select=c(1,3)`, individuals of blocks 1 and 3 are plotted on separate figures.

If `graphtype="globalcor"`, correlations of original variables with the global components are depicted.

If `select=NULL`, correlations of the variables of all the blocks are plotted on the same figure.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="blockcor"`, correlations of original variables with the block components are depicted.

If `select=NULL`, correlations of the variables of each block are plotted on separate figures.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="explY"`, percentages of inertia of Y block explained by the global components are drawn.

If `graphtype="cumexplY"`, cumulative percentages of inertia of Y block explained by the global components are drawn.

If `graphtype="explX"`, percentages of inertia of X blocks explained by the global components are drawn.

If `graphtype="cumexplX"`, cumulative percentages of inertia of X blocks explained by the global components are drawn.

`graphtype="crit"` plots the values of the maximization criterion.

`graphtype="contrib"` depicts the contribution of each block of variables to the determination of the global components.

For `graphtype="explY"`, `"cumexplY"`, `"explX"`, `"cumexplX"`, `"crit"` and `"contrib"`, if `select=NULL`, all the dimensions are plotted.

But if for example, `select=5`, only the first five dimensions are plotted.

### Value

Returns graphs showing the projection of individuals in both global and block components, the correlations of variables with the global and block components, the percentages of inertia of both Y block and X blocks explained by the global components and their cumulative values, the values of the maximization criterion and the contributions of the blocks to the determination of global components.

**Author(s)**

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**

[MBPLS](#)

**Examples**

```
data(ham)
X=ham$X
Y=ham$Y
group=ham$group
res.mbpls <- MBPLS(X, Y, group, plotgraph=FALSE)
plot(res.mbpls, graphtype="globalscores")
plot(res.mbpls, graphtype="globalcor")
```

---

plot.MBWCov

*Main Graphs for Multiblock Weighted Covariate analysis (MB-WCov)*

---

**Description**

Plot the main graphs for MB-WCov.

**Usage**

```
## S3 method for class 'MBWCov'
plot(
  x,
  axes = c(1, 2),
  graphtype = c("saliences", "globalscores", "blockscores", "globalcor", "blockcor",
    "exply", "cumexply", "explX", "cumexplX", "crit", "contrib"),
  select = NULL,
  max.overlaps = 20,
  xlim = NULL,
  ylim = NULL,
  title = NULL,
  color = NULL,
  ...
)
```

**Arguments**

x	An object of class MBWCov.
axes	A vector of length 2 which specifies the global components to plot (by default the first two).
graphtype	Type of graph to plot. Either "saliences", "globalscores", "blockscores", "globalcor", "blockcor", "explY", "cumexplY", "explX", "cumexplX", "crit" or "contrib". Refer to the details section.
select	Selection of elements to plot (by default, select=NULL). Refer to the details section.
max.overlaps	Exclude text labels that overlap too many things (by default, 20).
xlim	Range for the plotted 'x' values.
ylim	Range for the plotted 'y' values.
title	Title of the graph to draw.
color	Color for the plot.
...	Further arguments.

**Details**

The arguments `graphtype` and `select` are used as follow.

If `graphtype="saliences"`, the relationships between blocks of variables are shown.

If `select=NULL`, all the blocks are shown, otherwise, only the selected ones are shown.

If `graphtype="globalscores"`, individuals are projected on the space formed by the global components.

In this case, if for example, `select=NULL`, all the individuals are plotted. However, if `select=5`, only the first five individuals are plotted.

If `graphtype="blockscores"`, individuals are projected on the space formed by the block components.

If `select=NULL`, individuals of each block are plotted on separate figures.

If `select=c(1,3)`, individuals of blocks 1 and 3 are plotted on separate figures.

If `graphtype="globalcor"`, correlations of original variables with the global components are depicted.

If `select=NULL`, correlations of the variables of all the blocks are plotted on the same figure.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="blockcor"`, correlations of original variables with the block components are depicted.

If `select=NULL`, correlations of the variables of each block are plotted on separate figures.

If `select=c(1,3)`, correlations of the variables of blocks 1 and 3 are plotted.

If `graphtype="explY"`, percentages of inertia of Y block explained by the global components are drawn.

If `graphtype="cumexplY"`, cumulative percentages of inertia of Y block explained by the global components are drawn.

If `graphtype="explX"`, percentages of inertia of X blocks explained by the global components are drawn.

If `graphtype="cumexplX"`, cumulative percentages of inertia of X blocks explained by the global components are drawn.

`graphtype="crit"` plots the values of the maximization criterion.

graphtype="contrib" depicts the contribution of each block of variables to the determination of the global components.

For graphtype="explY", "cumexplY", "explX", "cumexplX", "crit" and "contrib", if select=NULL, all the dimensions are plotted.

But if for example, select=5, only the first five dimensions are plotted.

### Value

Returns graphs showing relationships between the explanatory blocks of variables, the projection of individuals in both global and block components, the correlations of variables with the global and block components, the percentages of inertia of both Y block and X blocks explained by the global components and their cumulative values, the values of the maximization criterion and the contributions of the blocks to the determination of global components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### See Also

[MBWCov](#)

### Examples

```
data(ham)
X=ham$X
Y=ham$Y
group=ham$group
res.mbwcov <- MBWCov(X, Y, group, plotgraph=FALSE)
plot(res.mbwcov, graphtype="saliences")
plot(res.mbwcov, graphtype="globalscores")
```

---

print.ComDim

*Main Results for Common Dimensions analysis (ComDim)*

---

### Description

Print the main results for ComDim.

### Usage

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

**Arguments**

`x`                    An object of class `ComDim`.  
`...`                  Further arguments passed to or from other methods.

**Value**

Returns a list of the following elements:

`components` : Numeric vector of length two that indicates the number of global components of the analysis and the number of global components to print.

`optimalcrit` : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

`cumexplained` : Two columns matrix of percentages of total inertia of the blocks of variables explained by the successive global components and their cumulative values.

`explained.X` : Matrix of percentages of inertia explained for each `Xb` block.

`saliences` : Matrix containing the specific weights of different blocks of variables on global components.

`contrib` : Matrix of contribution of each `Xb` block to the determination of global components.

`T` : Matrix of global components (scores of individuals).

`C` : Compromise matrix (unnormed global components).

`globalcor` : Matrix of correlation coefficients between the original variables and the global components.

`cor.g.b` : Array that gives the correlation of the global components with their respective block components.

`Block`                : Results associated with each block of variables.

- `T.b` : Array that contains the matrices of block components.
- `blockcor` : List of matrices of correlation coefficients between the original variables of each block and the block components.

**Author(s)**

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**

[ComDim](#)

**Examples**

```
data(ham)
X=ham$X
group=ham$group
res.comdim <- ComDim(X, group, plotgraph=FALSE)
print(res.comdim)
```

---

```
print.MBPCA          Main Results for Multiblock Principal Components Analysis (MB-PCA)
```

---

**Description**

Print the main results for MB-PCA.

**Usage**

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

**Arguments**

```
x          An object of class MBPCA.
...        Further arguments passed to or from other methods.
```

**Value**

Returns a list of the following elements:

`components` : Numeric vector of length two that indicates the number of global components of the analysis and the number of global components to print.

`optimalcrit` : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

`cumexplained` : Two columns matrix of percentages of total inertia of the blocks of variables explained by the successive global components and their cumulative values.

`explained.X` : Matrix of percentages of inertia explained in each Xb block.

`contrib` : Matrix of contribution of each Xb block to the determination of global components.

`T` : Matrix of global components (scores of individuals).

`C` : Compromise matrix (unnormed global components).

`globalcor` : Matrix of correlation coefficients between variables and global components.

`cor.g.b` : Array that gives the correlation of the global components with their respective block components.

`Block` : Results associated with each block Xb.

- `T.b` : Array that contains the matrices of block components.
- `blockcor` : List of matrices of correlation coefficients between the original variables of each block and the block components.

**Author(s)**

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**[MBPCA](#)**Examples**

```

data(ham)
X=ham$X
group=ham$group
res.mbpca <- MBPCA(X, group, plotgraph=FALSE)
print(res.mbpca)

```

---

print.MBPLS	<i>Main Results for Multiblock Partial Least Squares (MB-PLS) regression</i>
-------------	--

---

**Description**

Print the main results for MB-PLS regression.

**Usage**

```

## S3 method for class 'MBPLS'
print(x, ...)

```

**Arguments**

x	An object of class MBPLS.
...	Further arguments passed to or from other methods.

**Value**

Returns a list of the following elements:

components : Numeric vector of length two that gives the number of global components of the analysis and the number of global components to print.

optimalcrit : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

cumexplained : Four columns matrix of percentages of total inertia of the explanatory blocks, percentages of inertia of the response block explained by the successive global components and their cumulative values.

explained.X : Matrix of percentages of inertia explained for each Xb block.

explained.Y : Matrix of percentages of inertia explained for each Y variable.

contrib : Matrix of contribution of each Xb block to the determination of global components.

T : Matrix of global components (scores of individuals).

C : Compromise matrix (unnormed global components).

U : Matrix of components associated with the response block of variables.

globalcor : Matrix of correlation coefficients between the original variables and the global components.

cor.g.b : Array that gives the correlation of the global components with their respective block components.

betaY : Array of regression coefficients.

Block : Results associated with each block of variables.

- T.b : Array that contains the matrices of block components.
- blockcor : List of matrices of correlation coefficients between the original variables of each block of variables and the block components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### See Also

[MBPLS](#)

### Examples

```
data(ham)
X=ham$X
group=ham$group
Y=ham$Y
res.mbpls <- MBPLS(X, Y, group)
print(res.mbpls)
```

---

print.MBWCov

*Main Results for Multiblock Weighted Covariate analysis (MB-WCov)*

---

### Description

Print the main results for MB-WCov.

### Usage

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

### Arguments

x                    An object of class MBWCov.  
 ...                  Further arguments passed to or from other methods.



**Value**

Returns a list of the following elements:

`components` : Numeric vector of length two that gives the number of global components of the analysis and the number of global components to print.

`optimalcrit` : Numeric vector that gives the optimal value of the criterion to be maximized for each dimension.

`cumexplained` : Four columns matrix of percentages of total inertia of the explanatory blocks, percentages of inertia of the response block explained by the successive global components and their cumulative values.

`explained.X` : Matrix of percentages of inertia explained for each Xb block.

`explained.Y` : Matrix of percentages of inertia explained for each Y variable.

`saliences` : Matrix containing the specific weights of each explanatory block of variables on global components.

`contrib` : Matrix of contribution of each Xb block to the determination of global components.

`T` : Matrix of global components (scores of individuals).

`C` : Compromise matrix (unnormed global components).

`U` : Matrix of components associated with the response block of variables.

`globalcor` : Matrix of correlation coefficients between the original variables and the global components.

`cor.g.b` : Array that gives the correlation of the global components with their respective block components.

`betaY` : Array of regression coefficients.

`Block` : Results associated with each block of variables.

- `T.b` : Array that contains the matrices of block components.
- `blockcor` : List of matrices of correlation coefficients between the original variables of each block of variables and the block components.

**Author(s)**

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**

[MBWCov](#)

**Examples**

```
data(ham)
X=ham$X
group=ham$group
Y=ham$Y
res.mbwcov <- MBWCov(X, Y, group)
```

```
print(res.mbwcov)
```

---

summary.ComDim

*Summary Results for Common Dimensions analysis (ComDim)*

---

## Description

Gives key results for ComDim.

## Usage

```
## S3 method for class 'ComDim'  
summary(object, nvar = NULL, ncompprint = NULL, digits = 2, ...)
```

## Arguments

object	An object of class ComDim.
nvar	Number of variables to print. By default (NULL), all the variables are printed.
ncompprint	Number of global components to print. By default (NULL), the number of global components printed for the main function ComDim.
digits	Number of decimal points (by default 2).
...	Further arguments.

## Value

Returns the percentages of inertia explained by successive global components, their cumulative values, the saliences and the correlations of the original variables with the global components.

## Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

## See Also

[ComDim](#)

## Examples

```
data(ham)  
X=ham$X  
group=ham$group  
res.comdim <- ComDim(X, group, plotgraph=FALSE)  
summary(res.comdim)
```

---

summary.MBPCA	<i>Summary Results for Multiblock Principal Components Analysis (MB-PCA)</i>
---------------	--

---

### Description

Gives key results for MB-PCA.

### Usage

```
## S3 method for class 'MBPCA'  
summary(object, nvar = NULL, ncompprint = NULL, digits = 2, ...)
```

### Arguments

object	An object of class MBPCA.
nvar	Number of variables to print. By default (NULL), all the variables are printed.
ncompprint	Number of global components to print. By default (NULL), the number of global components printed for the main function MBPCA.
digits	Number of decimal points (by default 2).
...	Further arguments.

### Value

Returns the percentages of inertia explained by successive global components, their cumulative values and the correlations of the original variables with the global components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### See Also

[MBPCA](#)

### Examples

```
data(ham)  
X=ham$X  
group=ham$group  
res.mbpca <- MBPCA(X, group, plotgraph=FALSE)  
summary(res.mbpca)
```

---

summary.MBPLS	<i>Summary Results for Multiblock Partial Least Squares (MB-PLS) regression</i>
---------------	---

---

**Description**

Gives key results for MB-PLS.

**Usage**

```
## S3 method for class 'MBPLS'
summary(object, nvar = NULL, ncompprint = NULL, digits = 2, ...)
```

**Arguments**

object	An object of class MBPLS.
nvar	Number of variables to print. By default (NULL), all the variables are printed.
ncompprint	Number of global components to print. By default (NULL), the number of global components printed for the main function MBPLS.
digits	Number of decimal points (by default 2).
...	Further arguments.

**Value**

Returns the percentages of inertia explained by successive global components (for both X and Y), their cumulative values and the correlations of the variables with the global components.

**Author(s)**

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

**See Also**

[MBPLS](#)

**Examples**

```
data(ham)
X=ham$X
group=ham$group
Y=ham$Y
res.mbpls <- MBPLS(X, Y, group, plotgraph=FALSE)
summary(res.mbpls)
```

---

summary.MBWCov	<i>Summary Results for Multiblock Weighted Covariate analysis (MB-WCov)</i>
----------------	---

---

### Description

Gives key results for MB-WCov.

### Usage

```
## S3 method for class 'MBWCov'  
summary(object, nvar = NULL, ncompprint = NULL, digits = 2, ...)
```

### Arguments

object	An object of class MBWCov.
nvar	Number of variables to print. By default (NULL), all the variables are printed.
ncompprint	Number of global components to print. By default (NULL), the number of global components printed for the main function MBWCov.
digits	Number of decimal points (by default 2).
...	Further arguments.

### Value

Returns the percentages of inertia explained by successive global components (for both X and Y), their cumulative values, the saliences and the correlations of the variables with the global components.

### Author(s)

Essomanda TCHANDAO MANGAMANA <tchanesso@yahoo.fr>, Véronique CARIOU, Evelyne VIGNEAU.

### See Also

[MBWCov](#)

### Examples

```
data(ham)  
X=ham$X  
group=ham$group  
Y=ham$Y  
res.mbwcov <- MBWCov(X, Y, group, plotgraph=FALSE)  
summary(res.mbwcov)
```

# Index

## \* datasets

ham, 4

ComDim, 2, 14, 21, 26

ham, 4

MBPCA, 5, 16, 23, 27

MBPLS, 7, 18, 24, 28

MBWCov, 9, 20, 25, 29

plot.ComDim, 4, 12

plot.MBPCA, 7, 14

plot.MBPLS, 9, 16

plot.MBWCov, 11, 18

print.ComDim, 4, 20

print.MBPCA, 7, 22

print.MBPLS, 9, 23

print.MBWCov, 11, 24

summary.ComDim, 4, 26

summary.MBPCA, 7, 27

summary.MBPLS, 9, 28

summary.MBWCov, 11, 29