Package 'tuckerR.mmgg'

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Type Package

Title Three-Mode Principal Components Analysis

Version 1.5.1

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Description Performs Three-Mode Principal Components Analysis, which carries out Tucker Models.

Depends R (>= 3.3.0)

Suggests knitr,testthat

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

URL https://github.com/gusart/tuckerR_mmgg

BugReports https://github.com/gusart/tuckerR_mmgg/issues

NeedsCompilation no

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Repository CRAN

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R topics documented:

`diffit` *Aplication of the Diffit method.*

Description

The diffit method is used to apply when we need to know the axis number to be gathered in the P mode, and Q mode. The third mode, K it is related to the environment numbers. The diffit method consist on fitting each value with the Tuckle algorithm.

Usage

```
diffit(datos, amb = 2, stand = TRUE, niter = 10000)
```

Arguments

`datos`	datos original data from data frames
`amb`	numbers of environment
`stand`	a boolean value, if it is TRUE (value set by default) each variable is centered and scale by variable.
`niter`	the iteration number for the Tuckals algorithm, by default 10000 iteration.

Details

The final result is the model which has the most coefficient diffits the greatest variability explained and the one which exceed the threshold.

Value

`saldiffit` a list with a combination numbers of axis, percentage of variability explained and Diffit rate. The critic value or threhold is also return.

Author(s)

Marta Marticorena, Gustavo Gimenez, Cecilia Gonzalez, Sergio Bramardi

References

MARTICORENA, M.; BRAMARDI, S.; DEFACIO, R. 2010. Characterization of maize populations in different environmental conditions by means of Three-Mode Principal Components Analysis. Revista Ciencia e Investigacion Agraria. 37(3): 93-105.

Timmerman, M.E., and H. Kiers. 2000. Three-mode principal components analysis. Choosing numbers of components and sensitivity to local optima. The British Journal of the Mahematical and Statistical Psychology 53: 1-16.

Examples

```
#Copy and paste this example in your console without the comment
#data(maize_pop,package = "tuckerR.mmgg")
#dif_sal <- diffit(maize_pop,amb=2)
#print(dif_sal) the best combination is 3 3 2
```

`maize_pop` *31 Native Populations of Maize from Province of Buenos Aires*

Description

These populations are part of collection of local populations corresponding to different races that are conserved in the Active Germplasm Bank of INTA Pergamino Experimental Station, Argentina.

Usage

```
data("maize_pop")
```

Format

A data frame with 10 characteristics of 31 maize populations in two different conditions corresponding to production areas of Buenos Aires. Since the variables are repeated in both places the data frame has a total of 20 variables, 10 for an environment and evaluated them in the other conditions. First and second conditions the numerical vectors are the following:

`LMZ` a numeric vector with ear length(cm), in first condition

`DMZ` a numeric vector with ear diameter (mm),in first condition

`AGR` a numeric vector with grain width (mm),in first condition

`LGR` a numeric vector with grain length (cm), in first condition

`PROL` a numeric vector prolicicacy (ears/plant), in first condition

`GRXM` a numeric vector with grains by meter in first condition

`PESO_1000` a numeric vector with weight of 1000 grains (grs)

`REND` a numeric vector with yield (kg/ha), in first condition

`ALTPL` a numeric vector height of the plant (cm) in first condition

`ALTMZ` a numeric vector with height of ear insertion (cm) in first condition

`LMZ` a numeric vector with ear length(cm), in second condition

`DMZ` a numeric vector with ear diameter (mm),in second condition

`AGR` a numeric vector with grain width (mm),in second condition

`LGR` a numeric vector with grain length (cm), in second condition

`PROL` a numeric vector prolicicacy (ears/plant), in second condition

`GRXM` a numeric vector with grains by meter in second condition

`PESO_1000` a numeric vector with weight of 1000 grains (grs) in second condition

`REND` a numeric vector with yield (kg/ha), in second condition

`ALTPL` a numeric vector height of the plant (cm) in second condition

`ALTMZ` a numeric vector with height of ear insertion (cm) in second condition

Details

Ten quantitative variables were evaluated in two tests conducted in the 2003/04 season in the localities Pergamino A INTA) and Ferre. These variables allowed for morphologic-agronomic characterization and may be influenced, to a certain extent, by environmental conditions.

References

MARTICORENA, M.; BRAMARDI, S.; DEFACIO, R. (2010). Characterization of maize populations in different environmental conditions by means of Three-Mode Principal Components Analysis. Revista Ciencia e Investigacion Agraria. 37(3): 93-105.

Examples

```
data(maize_pop,package = "tuckerR.mmgg")
str(maize_pop); summary(maize_pop)
```

---

matrition *Concatenate data frame in array and matrix by cases, variables and environments*

Description

Concatenate data frame in array and matrix by cases, variables and environments to performs three mode principal components with the function tucker2R.

Usage

```
matrition(datos, I, J, K)
```

Arguments

datos	original data from data frames
I	the numbers of cases
J	the numbers of variables
K	the numbers of environment or conditions

Details

This process is also knowing as 'matricizing' or 'unfolding'.

Value

matrizlista return a list with: the array "m" with all the data concatenate in array. X1 the data is concatenate by cases, X2 the data concatenate by variables and X3 the data concatenate by environments.

Examples

```
data(maize_pop,package = "tuckerR.mmgg")
conc_matrix <- matrition(maize_pop,I=30,J=10,K=2)
conc_matrix$m  #get m array
conc_matrix$X1 #get matrix by cases
conc_matrix$X2 #get matrix by variables
conc_matrix$X3 #get matrix by environments
```

`plot` *Plot an interactive Biplot*

Description

The interactive Biplot consists of combining two of the modes, obtaining markers for the individuals and vectors for the variables that were concatenated with the conditions. To plot the interactive Biplot this function need the output for the tucker2R function.

Usage

```
plot(saltuck, ...)

## S3 method for class 'marta'
plot(saltuck)
```

Arguments

`saltuck`	is a list with the results of the algorithm to plot the biplot, where the names of the conditions are well kept.
`...`	Arguments to be passed to plot.

Details

The interactive Biplot allows for the visualization of the inter structure of the differents data tables.

Value

`NULL`

Author(s)

Marta Marticorena, Gustavo Gimenez, Cecilia Gonzalez, Sergio Bramardi

References

MARTICORENA, M.; BRAMARDI, S.; DEFACIO, R. 2010. Characterization of maize populations in different environmental conditions by means of Three Mode Principal Components Analysis. Revista Ciencia e Investigacion Agraria. 37(3): 93-105.

Gabriel, K.R. 1971. The biplot graphic display of matrices with appications to principal components analysis. Biometrika. 58, 453-467.

Examples

```
data(maize_pop,package = "tuckerR.mmgg")
prueba1 <- tucker2R(maize_pop, amb=2, stand=TRUE, nc1=3, nc2=3)
plot(prueba1)
```

---

tucker2R *Three-Mode Principal Components: Tucker 2 Model*

Description

This function performs Three-Mode Principal Components using Tucker-2 Model.Compute all the output necessary to plot interactive Biplot.The Three-Mode Principal Component Analysis, provides both useful analytic and graphic tools to study and characterize phytogenetic resources, especially when the influence of environmental factors are possible.

Usage

```
tucker2R(datos, amb= 2, stand = TRUE, nc1 = 2, nc2 = 2, niter = 10000)
```

Arguments

datos	a data frame with n rows for individuals and p variable for columns. All the conditions must be the same variables names and individuals.
amb	The diferent conditions, in which the same variables and individuals had been studied. By default is 2.
stand	a boolean value, if it is TRUE (value set by default) each variable is centered and scale by variable.
nc1	number of components in the first mode, by default is 2
nc2	number of components in the second mode, by default is 2
niter	the iteration number for the Tuckals algorithm, by default 10000 iteration

Details

To determine the number of components that are going to be retained, we use previously to the algorithm applications,method called DifFit. The number of components in the third mode is obtained from the number of conditions.The labels of the variables must be the same for all conditions in the data frame.

Value

`Resultado` a list which stores the name of the individual and the variables, the number of iterations, the variability explained by the model, and the total variability. `Proyeccion` It is a list which holds the projection of individuals and variables to see if the biplot is difficult to understand because of the huge number of cases or plotted vectors. `saltuck` is a list with the results of the algorithm to plot the biplot, where the names of the conditions are well kept.

Author(s)

Marta Marticorena, Gustavo Gimenez, Cecilia Gonzalez, Sergio Bramardi

References

Marticorena, M.; Bramardi, S.; Defacio, R. 2010. Characterization of maize populations in different environmental conditions by means of Three-Mode Principal Components Analysis. Revista Ciencia e Investigacion Agraria. 37(3): 93-105.

Timmerman, M.E., and H. Kiers. 2000. Three-mode principal components analysis. Choosing numbers of components and sensitivity to local optima. The British Journal of the Mahematical and Statistical Psychology 53: 1-16.

See Also

The function plot.marta for a complete analisis.

Examples

```
data(maize_pop,package = "tuckerR.mmgg")
(output <- tucker2R(maize_pop,amb=2,stand=TRUE,nc1=3,nc2=3))
```

---

tuckerR.mmgg *Three-Mode Principal Components: Tuckers Models*

Description

This package performs Three-Mode Principal Components using Tuckers Models and plot interactive Biplot. These Three-Mode Principal Component Analysis, provides both useful analytic and graphic tools to study and characterize phytogenetic resources, specially when the influence of environmental factors are possible.

Author(s)

Marta Marticorena, Gustavo Gimenez, Cecilia Gonzalez, Sergio Bramardi

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