Package 'MaxSkew'

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Type Package

Title Orthogonal Data Projections with Maximal Skewness

Version 1.1

Date 2017-05-02

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Maintainer Cinzia Franceschini <cinziafranceschini@msn.com>

Suggests datasets

Description

It finds Orthogonal Data Projections with Maximal Skewness. The first data projection in the output is the most skewed among all linear data projections. The second data projection in the output is the most skewed among all data projections orthogonal to the first one, and so on.

License GPL-2

NeedsCompilation no

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MaxSkew-package *MaxSkew: skewness-based projection pursuit*

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Details

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Author(s)

Cinzia Franceschini and Nicola Loperfido

References

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Loperfido, N. (2010). Canonical Transformations of Skew-Normal Variates. Test 19, 146-165.

Loperfido, N. (2013). Skewness and the Linear Discriminant Function. Statistics and Probability Letters 83, 93-99.

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Examples

```
## Example 1. Run MaxSkew on the iris data
data(iris)
iris<-data.matrix(iris) #returns the matrix obtained by converting the data frame to numeric mode
MaxSkew(iris[,1:3],5,2,FALSE) # matrix whose columns are the two projections with maximal skewness
MaxSkew(iris[,1:2],5,1,FALSE) #projection with maximal skewness of the first two variables
#MaxSkewBiv(iris[,1],iris[,2]) #obtains the same of MaxSkew(iris[,1:2],5,1)
```

```
## Example 2. Run MaxSkew on the OLYMPIC_DECATHLON_2016 data
data(OLYMPIC_DECATHLON_2016)
OLYMPIC_DECATHLON_2016_matrix<-data.matrix(OLYMPIC_DECATHLON_2016) #returns a data matrix
MaxSkew(OLYMPIC_DECATHLON_2016_matrix[,4:13],10,2,TRUE) #it returns also the scatterplot
MaxSkew(OLYMPIC_DECATHLON_2016_matrix[,4:13],10,2,FALSE)#as in example 1

OLYMPIC_DECATHLON_2016_projections<-MaxSkew(OLYMPIC_DECATHLON_2016_matrix[,4:13],10,2,FALSE)
plot(OLYMPIC_DECATHLON_2016_projections) #scatterplot of the first two projections
##install.packages("calibrate")
##library(calibrate)
##textxy(OLYMPIC_DECATHLON_2016_projections[,1],OLYMPIC_DECATHLON_2016_projections[,2],
##OLYMPIC_DECATHLON_2016$ATHLETE,offset=0.5)
```

`.MaxSkewBiv` *MaxSkewBiv: skewness-based projection pursuit for bivariate data*

Description

Finds Orthogonal Data Projections with Maximal Skewness for Bivariate Random Vectors

Usage

```
.MaxSkewBiv(x, y)
```

Arguments

`x`	it is a numerical variable
`y`	it is a numerical variable

Value

`.projectionBIV`	Vector of projected data when the original data are bivariate. The user can obtain it by writing ".projectionBIV", and he can obtain a scatterplot of the projection by writing plot(.projectionBIV).

Author(s)

Cinzia Franceschini and Nicola Loperfido

References

de Lathauwer L., de Moor B.and Vandewalle J. (2000). Onthebestrank-1andrank-(R_1,R_2,...R_N) approximation of high-order tensors. SIAM Jour. Matrix Ana. Appl. 21, 1324-1342.

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.MaxSkewThree *MaxSkew: skewness-based projection pursuit*

Description

Finds Orthogonal Data Projections with Maximal Skewness for Trivariate Random Vectors

Usage

```
.MaxSkewThree(data, iterations)
```

Arguments

data	Data matrix where rows and columns represent units and variables.
iterations	Number of required iterations.

Details

It is an internal function called by MaxSkew

Author(s)

Cinzia Franceschini and Nicola Loperfido

References

de Lathauwer L., de Moor B.and Vandewalle J. (2000). Onthebestrank-1andrank-(R_1,R_2,...R_N) approximation of high-order tensors. SIAM Jour. Matrix Ana. Appl. 21, 1324-1342.

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MaxSkew *MaxSkew: skewness-based projection pursuit*

Description

Finds Orthogonal Data Projections with Maximal Skewness

Usage

```
MaxSkew(data, iterations, components, plot)
```

Arguments

data	Data matrix where rows and columns represent units and variables.
iterations	It is a positive integer
components	Number of orthogonal projections maximizing skewness. It is a positive integer smaller than the number of variables.
plot	Dichotomous variable: TRUE/FALSE. If plot is set equal to TRUE (FALSE) the scatterplot appears (does not appear) in the output.

Value

`projectionmatrix`
: Matrix of projected data. The i-th row represents the i-th unit, while the j-th column represents the j-th projection.

`pairs(projectionmatrix[, 2:i], labels=values, main="Projections")`
: It is the multiple scatterplot of the projections maximizing skewness.

`.projectionBIV`
: Vector of projected data when the original data are bivariate.The user can obtain a scatterplot of the projection by writing plot(.projectionBIV)

Author(s)

Cinzia Franceschini and Nicola Loperfido

References

de Lathauwer L., de Moor B.and Vandewalle J. (2000). Onthebestrank-1andrank-(R_1,R_2,...R_N) approximation of high-order tensors. SIAM Jour. Matrix Ana. Appl. 21, 1324-1342.

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`OLYMPIC_DECATHLON_2016`

OLYMPIC_DECATHLON_2016

Description

Results of the athletes competing in the decathlon at the Games of the XXXI Olympiad (Rio de Janeiro, Brazil, year 2016). The dataset contains the points scored in each event by the 23 decathletes who who completed the dacathlons, together with their names and nationalities. It is freely available at www.iaaf.org, the official website of the IAAF (International Association of Athletics Federations).

Usage

```
data("OLYMPIC_DECATHLON_2016")
```

Format

A data frame with 23 observations on the following 13 variables.

`OS` a numeric vector. Athletes' ranking.

`ATHLETE` a factor with levels `Adam SebastianHELCELET` `Akihiko NAKAMURA` `Arthur ABELE` `Ashton EATON` `Bastien AUZEIL` `Cedric DUBLER` `Damian WARNER` `Dominik DISTELBERGER` `Jeremy TAIWO` `Kai KAZMIREK` `Karl Robert SALURI` `Keisuke USHIRO` `Kevin MAYER` `Kurt FELIX` `Larbi BOURRADA` `Leonel SUAREZ` `Lindon VICTOR` `Luiz Alberto DE ARAUJO` `Pau TONNESEN` `Pawel WIESIOLEK` `Thomas VAN DER PLAETSEN` `Yordani GARCIA` `Zach ZIEMEK`

`COUNTRY` a factor with levels `ALG` `AUS` `AUT` `BEL` `BRA` `CAN` `CUB` `CZE` `ESP` `EST` `FRA` `GER` `GRN` `JPN` `POL` `USA`

`'100.METRES'` a numeric vector. Points scored in the one hundred metres.

`LONG.JUMP` a numeric vector. Points scored in the long jump.

`SHOT.PUT` a numeric vector. Points scored in the shot put.

`HIGH.JUMP` a numeric vector. Points scored in the high jump.

`'400.METRES'` a numeric vector. Points scored in the four hundred metres.

`'110.METRES.HURDLES'` a numeric vector. Points scored in the one hundred and ten metres hurdles.

`DISCUS.THROW` a numeric vector. Points scored in the discus throw.

`POLE.VAULT` a numeric vector. Points scored in the pole vault.

`JAVELIN.THROW` a numeric vector. Points scored in the javelin throw.

`X1500.METRES` a numeric vector. Points scored in the one thousand and five hundred metres.

Source

www.iaaf.org

Examples

```
data(OLYMPIC_DECATHLON_2016)
## maybe str(OLYMPIC_DECATHLON_2016) ; plot(OLYMPIC_DECATHLON_2016) ...
```

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