Package 'ToolsForCoDa'

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Type Package

Title Multivariate Tools for Compositional Data Analysis

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Depends R (>= 1.8.0), MASS, HardyWeinberg, calibrate

Description Provides functions for multivariate analysis with compositional data. Includes a function for doing compositional canonical correlation analysis. This analysis requires two data matrices of compositions, which can be adequately transformed and used as entries in a specialized program for canonical correlation analysis, that is able to deal with singular covariance matrices. The methodology is described in Graffelman et al. (2017) <doi:10.1101/144584>.

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URL www.R-project.org, http://www-eio.upc.edu/~jan

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R topics documented:

Artificial *Two sets of 3-part compositions*

Description

The list object `Artificial` contains two data frames of 3-part compositions. The data refer to the example in Section 3.1 of Graffelman et al. (2017)

Usage

```
data(Artificial)
```

Format

A list containing two data frames containing 100 observations.

Source

Laird, N. M. and Lange, C. Table 7.11, p. 124

References

Graffelman, J., Pawlowsky-Glahn, V., Egozcue, J.J. and Buccianti, A. (2017) Compositional Canonical Correlation Analysis.

canocov *Canonical correlation analysis.*

Description

Function `canocov` performs a canonical correlation analysis. It operates on raw data matrices, which are only centered in the program. It uses generalized inverses and can deal with structurally singular covariance matrices.

Usage

```
canocov(X, Y)
```

Arguments

`X`	The n times p X matrix of observations
`Y`	The n times q Y matrix of observations

Details

`canocov` computes the solution by a singular value decomposition of the transformed between set covariance matrix.

Value

Returns a list with the following results

`ccor`	the canonical correlations
`A`	canonical weights of the X variables
`B`	canonical weights of the Y variables
`U`	canonical X variates
`V`	canonical Y variates
`Fs`	biplot markers for X variables (standard coordinates)
`Gs`	biplot markers for Y variables (standard coordinates)
`Fp`	biplot markers for X variables (principal coordinates)
`Gp`	biplot markers for Y variables (principal coordinates)
`Rxu`	canonical loadings, (correlations X variables, canonical X variates)
`Rxv`	canonical loadings, (correlations X variables, canonical Y variates)
`Ryu`	canonical loadings, (correlations Y variables, canonical X variates)
`Ryv`	canonical loadings, (correlations Y variables, canonical Y variates)
`Sxu`	covariance X variables, canonical X variates
`Sxv`	covariance X variables, canonical Y variates
`Syu`	covariance Y variables, canonical X variates
`Syv`	covariance Y variables, canonical Y variates
`fitRxy`	goodness of fit of the between-set correlation matrix
`fitXs`	adequacy coefficients of X variables
`fitXp`	redundancy coefficients of X variables
`fitYs`	adequacy coefficients of Y variables
`fitYp`	redundancy coefficients of Y variables

Author(s)

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References

Hotelling, H. (1935) The most predictable criterion. Journal of Educational Psychology (26) pp. 139-142.

Hotelling, H. (1936) Relations between two sets of variates. Biometrika (28) pp. 321-377.

Johnson, R. A. and Wichern, D. W. (2002) Applied Multivariate Statistical Analysis. New Jersey: Prentice Hall.

See Also

`cancor`

Examples

```
set.seed(123)
X <- matrix(runif(75),ncol=3)
Y <- matrix(runif(75),ncol=3)
cca.results <- canocov(X,Y)
```

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cen *centring of a data matrix*

Description

centres the columns of a matrix to mean zero.

Usage

```
cen(X,w=rep(1,nrow(X))/nrow(X))
```

Arguments

X	a raw data matrix.
w	a vector of case weights.

Value

returns a matrix

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

Examples

```
X<-matrix(runif(10),ncol=2)
Y<-cen(X)
print(Y)
```

clrmat *Centred log-ratio transformation*

Description

Program clrmat calculates the centred log-ratio transformation for a matrix of compositions.

Usage

```
clrmat(X)
```

Arguments

X	A matrix of compositions

Value

A matrix containing the transformed data

Author(s)

Jan Graffelman <jan.graffelman@upc.edu>

Examples

```
data(Artificial)
Xsim.com <- Artificial$Xsim.com
Xclr <- clrmat(Xsim.com)
```

tr *Compute the trace of a matrix*

Description

tr computes the trace of a matrix.

Usage

```
tr(X)
```

Arguments

X	a (square) matrix

Value

the trace (a scalar)

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

Examples

```
X <- matrix(runif(25),ncol=5)
print(X)
print(tr(X))
```

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