Package 'calibrate'

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Title Calibration of Biplot Axes

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Depends R

Description Package for drawing calibrated scales with tick marks on (non-orthogonal) variable vectors in scatterplots and biplots.

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R topics documented:

`calibrate` *Calibration of Biplot and Scatterplot Axis*

Description

Routine for the calibration of any axis (variable vector) in a biplot or a scatterplot

Usage

```
calibrate(g,y,tm,Fr,tmlab=tm,tl=0.05,dt=TRUE,dp=FALSE,lm=TRUE,
verb=TRUE,axislab="",reverse=FALSE,shift=0,alpha=NULL,labpos=1,
weights=diag(rep(1,length(y))),axiscol="blue",cex.axislab=0.75,
graphics=TRUE,where=3,laboffset=c(0,0),m=matrix(c(0,0),nrow=1),
markerpos=3,showlabel=TRUE,lwd=1)
```

Arguments

`g`	the vector to be calibrated (2 x 1).
`y`	the data vector corresponding to `g`, appropriately centred and/or standardized.
`tm`	the vector of tick marks, appropiately centred and/or scaled.
`Fr`	the coordinates of the rows markers in the biplot.
`tmlab`	a list or vector of tick mark labels.
`tl`	the tick length. By default, the tick markers have length 0.05.
`dt`	draw ticks. By default, ticks markers are drawn. Set dt=F in order to compute calibration results without actually drawing the calibrated scale.
`dp`	drop perpendiculars. With dp=T perpendicular lines will be drawn from the row markers specified by Fr onto the calibrated axis. This is a graphical aid to read off the values in the corresponding scale.
`lm`	label markers. By default, all tick marks are labelled. Setting lm=F turns off the labelling of the tick marks. This allows for creating tick marks without labels. It is particularly useful for creating finer scales of tickmarks without labels.
`verb`	verbose parameter (F=be quiet, T=show results).
`axislab`	a label for the calibrated axis.
`reverse`	puts the tick marks and tick mark labels on the other side of the axis.
`shift`	a scalar that shifts the calibrated axis by a fixed distance.
`alpha`	a value for the calibration factor. This parameter should only be specified if a calibration is required that is different from the one that is optimal for data recovery.
`labpos`	position of the label for the calibrated axis (1,2,3 or 4).
`laboffset`	offset vector for the axis label. If specified, shifts the label by the specified amounts with respect to the current position.
`weights`	a matrix of weights (optional).
`axiscol`	color of the calibrated axis.
`cex.axislab`	character expansion factor for axis label and tick mark labels.
`graphics`	do graphics or not (F=no graphical output, T=draws calibrated scale).

where	label placement (1=beginning,2=middle,3=end).
m	vector of means.
markerpos	position specifier for the tick mark labels (1,2,3 or 4).
showlabel	show axis label in graph (T) or not (F).
lwd	line with for the calibrated axis

Details

This program calibrates variable vectors in biplots and scatterplots, by drawing tick marks along a given the vector and labelling the tick marks with specified values. The optimal calibration is found by (generalized) least squares. Non-optimal calibrations are possible by specifying a calibration factor (alpha).

Value

Returns a list with calibration results

useralpha	calibration factor specified by the user
optalpha	optimal calibration factor
lengthoneunit	length in the plot of one unit in the scale of the calibrated variable
gof	goodness of fit (as in regression)
gos	goodness of scale
M	coordinates of the tick markers
ang	angle in degrees of the biplot axis with the positive x-axis
yt	fitted values for the variable according to the calibration
e	errors according to the calibration
Fpr	coordinates of the projections of the row markers onto the calibrated axis
Mn	coordinates of the tick marker end points

Author(s)

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References

Gower, J.C. and Hand, D.J., (1996) Biplots. Chapman & Hall, London

Graffelman, J. and van Eeuwijk, F.A. (2005) Calibration of multivariate scatter plots for exploratory analysis of relations within and between sets of variables in genomic research Biometrical Journal, 47(6) pp. 863-879.

Graffelman, J. (2006) A guide to biplot calibration.

See Also

biplot

Examples

```
x <- rnorm(20,1)
y <- rnorm(20,1)
x <- x - mean(x)
y <- y - mean(y)
z <- x + y
b <- c(1,1)
plot(x,y,asp=1,pch=19)
tm<-seq(-2,2,by=0.5)
Calibrate.z <- calibrate(b,z,tm,cbind(x,y),axislab="Z",graphics=TRUE)
```

---

calves *Delivery of Dutch Calves*

Description

This data set gives a cross classification of 7275 calves born in the late nineties according to type of production and type of delivery.

Usage

```
data(calves)
```

Format

A data frame containing a contingency table of 7275 observations.

Source

Holland Genetics. http://www.hg.nl

References

Graffelman, J. (2005) *A guide to scatterplot and biplot calibration*.

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canocor *Canonical correlation analysis*

Description

`canocor` performs canonical correlation analysis on the basis of the standardized variables and stores extensive output in a list object.

Usage

```
canocor(X, Y)
```

Arguments

X	a matrix containing the X variables
Y	a matrix containing the Y variables

Details

canocor computes the solution by a singular value decomposition of the transformed between set correlation 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)
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)

Jan Graffelman ⟨jan.graffelman@upc.edu⟩

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 <- canocor(X,Y)
```

circle *Draw a circle*

Description

`circle` draws a circle in an existing plot.

Usage

```
circle(radius)
```

Arguments

`radius`	the radius of the circle

Value

NULL

Author(s)

Jan Graffelman ⟨jan.graffelman@upc.edu⟩

Examples

```
set.seed(123)
X <- matrix(rnorm(20),ncol=2)
plot(X[,1],X[,2])
circle()
```

dlines *Connect two sets of points by lines*

Description

`dlines` connects two sets of points by lines in a rowwise manner.

Usage

```
dlines(SetA, SetB, lin = "dotted")
```

Arguments

`SetA`	matrix with the first set of points
`SetB`	matrix with teh second set of points
`lin`	linestyle for the connecting lines

Value

NULL

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

See Also

lines

Examples

```
X <- matrix(runif(20),ncol=2)
Y <- matrix(runif(20),ncol=2)
plot(rbind(X,Y))
text(X[,1],X[,2],paste("X",1:10,sep=""))
text(Y[,1],Y[,2],paste("Y",1:10,sep=""))
dlines(X,Y)
```

---

goblets *Size measurements of archeological goblets*

Description

This data set gives 6 different size measurements of 25 goblets

Usage

```
data(goblets)
```

Format

A data frame containing 25 observations.

Source

Manly, 1989

References

Manly, B. F. J. (1989) *Multivariate statistical methods: a primer*. London: Chapman and Hall, London

heads *Dimensions of heads of first and second sons for 25 families*

Description

Variables X1 and X2 are the head length and head breadth of the first son and Y1 and Y2 are the same variables for the second son.

Usage

```
data(heads)
```

Format

A data frame containing 25 observations.

Source

Mardia, 1979, p. 121

References

Frets, G. P. (1921) *Heredity of head form in man*, Genetica 3, pp. 193-384.

Mardia, K. V. and Kent, J. T. and Bibby, J. M. (1979) *Multivariate Analysis*. Academic Press London.

Anderson, T. W. (1984) *An Introduction to Multivariate Statistical Analysis*. New York: John Wiley, Second edition.

linnerud *Linnerud's exercise and body measurements*

Description

The data set consist of 3 exercise variables (Tractions à la barre fixe, Flexions, Sauts) and 3 body measurements (Poids, Tour de talle, Pouls) of 20 individuals.

Usage

```
data(linnerud)
```

Format

A data frame containing 20 observations.

Source

Tenenhaus, 1998, table 1, page 15

References

Tenenhaus, M. (1998) *La Régression PLS*. Paris: Editions Technip.

ones *Generates a matrix of ones*

Description

`ones` generates a matrix of ones.

Usage

```
ones(n, p = n)
```

Arguments

`n`	number of rows
`p`	number of columns

Details

if only n is specified, the resulting matrix will be square.

Value

a matrix filled with ones.

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

See Also

`matrix`

Examples

```
Id <- ones(3)
print(Id)
```

origin *Origin*

Description

Draws coordinate axes in a plot.

Usage

```
origin(m=c(0,0))
```

Arguments

`m`	the coordinates of the means (2 x 1).

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

Examples

```
X <- matrix(runif(40),ncol=2)
plot(X[,1],X[,2])
origin(m=c(mean(X[,1]),mean(X[,2])))
```

---

rda *Redundancy analysis*

Description

`rda` performs redundancy analysis and stores extensive output in a list object.

Usage

```
rda(X, Y, scaling = 1)
```

Arguments

`X`	a matrix of x variables
`Y`	a matrix of y variables
`scaling`	scaling used for x and y variables. 0: x and y only centered. 1: x and y standardized

Details

Results are computed by doing a principal component analyis of the fitted values of the regression of y on x.

Plotting the first two columns of Gxs and Gyp, or of Gxp and Gys provides a biplots of the matrix of regression coefficients.

Plotting the first two columns of Fs and Gp or of Fp and Gs provides a biplot of the matrix of fitted values.

Value

Returns a list with the following results

`Yh`	fitted values of the regression of y on x
`B`	regression coefficients of the regresson of y on x
`decom`	variance decomposition/goodness of fit of the fitted values AND of the regression coefficients
`Fs`	biplot markers of the rows of Yh (standard coordinates)
`Fp`	biplot markers of the rows of Yh (principal coordinates)
`Gys`	biplot markers for the y variables (standard coordinates)
`Gyp`	biplot markers for the y variables (principal coordinates)
`Gxs`	biplot markers for the x variables (standard coordinates)
`Gxp`	biplot markers for the x variables (principal coordinates)

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

References

Van den Wollenberg, A.L. (1977) Redundancy Analysis, an alternative for canonical correlation analysis. Psychometrika 42(2): pp. 207-219.

Ter Braak, C. J. F. and Looman, C. W. N. (1994) Biplots in Reduced-Rank Regression. Biometrical Journal 36(8): pp. 983-1003.

See Also

princomp,canocor,biplot

Examples

```
X <- matrix(rnorm(75),ncol=3)
Y <- matrix(rnorm(75),ncol=3)
rda.results <- rda(X,Y)
```

---

storks *Frequencies of nesting storks in Denmark*

Description

Danish data from 1953-1977 giving the frequency of nesting storks, the human birth rate and the per capita electricity consumption.

Usage

```
data(storks)
```

Format

A data frame containing 25 observations.

Source

Gabriel and Odoroff, Table 1.

References

Gabriel, K. R. and Odoroff, C. L. (1990) Biplots in biomedical research. *Statistics in Medicine* 9(5): pp. 469-485.

`textxy` *Label points in a plot*

Description

Function textxy calls function text in order to add text to points in a graph. textxy chooses a different position for the text depending on the quadrant. This tends to produces better readable plots.

Usage

```
textxy(X, Y, labs, cx = 0.5, dcol = "black", m = c(0, 0))
```

Arguments

`X`	x coordinates of a set of points
`Y`	y coordinates of a set of points
`labs`	labels to be placed next to the points
`cx`	character expansion factor
`dcol`	colour for the labels
`m`	coordinates of the origin of the plot (default (0,0))

Value

NULL

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

References

Graffelman, J. (2006) A guide to biplot calibration.

See Also

`text`

Examples

```
x <- runif(50)
y <- runif(50)
plot(x,y)
textxy(x,y,1:50,m=c(mean(x),mean(y)))
```

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