Package ‘calibrate’

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Description Package for drawing calibrated scales with tick marks on (non-orthogonal)
variable vectors in scatterplots and biplots.
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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, 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, shiftvec=c(0, 0), shiftdir="none", shiftfactor=1.05)

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, appropriately 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.
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.
calibrate

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
shiftvec a shift vector for the calibrated axis ((0,0) by default)
shiftdir indicates in which direction the axis should be shifted ("left","right" or "none").
This direction is w.r.t. vector g
shiftfactor scalar by which the shift vector is stretched (or shrunken). By default, the length of the shift vector is stretched by 5 percent (shiftfactor = 1.05)

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
shiftvec the supplied or computed shift vector
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)

Jan Graffelman <jan.graffelman@upc.edu>
References


See Also

biplot

Examples

```r
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](http://www.hg.nl)

References

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


See Also

cancor

Examples

set.seed(123)
X <- matrix(rnorm(20),ncol=2)
plot(X[,1],X[,2])
circle(1,c(0,0))
**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 the second set of points
- **lin** linestype for the connecting lines

**Value**

NULL

**Author(s)**

Jan Graffelman (jan.graffelman@upc.edu)

**See Also**

lines

**Examples**

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

```r
data(goblets)
```

**Format**

A data frame containing 25 observations.

**Source**

Manly, 1989

**References**


---

### 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**

```r
data(heads)
```

**Format**

A data frame containing 25 observations.

**Source**

Mardia, 1979, p. 121
References


linnerud  
*Linnerud’s exercise and body measurements*

Description

The data set consist of 3 exercise variables (Tractions a 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


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

Description
Draws coordinate axes in a plot.

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

Arguments
m the coordinates of the means (2 x 1).
... other arguments passed on to the lines function

Author(s)
Jan Graffelman (jan.graffelman@upc.edu)

See Also
lines

Examples
X <- matrix(runif(40),ncol=2)
plot(X[,1],X[,2])
origin(m=c(mean(X[,1]),mean(X[,2])))
**rad2degree**

Convert radians to degrees.

**Description**

rad2degree converts radians to degrees.

**Usage**

```r
rad2degree(x)
```

**Arguments**

- **x**
  
an angle in radians

**Value**

the angle with the positive x-axis in degrees.

**Author(s)**

Jan Graffelman (jan.graffelman@upc.edu)

**Examples**

```r
x <- pi/2
a <- rad2degree(x)
cat("angle is",a,"degrees\n")
```

---

**rda**

Redundancy analysis

**Description**

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

**Usage**

```r
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 stan-
  
dardized
Details

Results are computed by doing a principal component analysis 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 biplot 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

- \( \text{Yh} \) fitted values of the regression of y on x
- \( \beta \) regression coefficients of the regression of y on x
- \( \text{decom} \) variance decomposition/goodness of fit of the fitted values AND of the regression coefficients
- \( \text{Fs} \) biplot markers of the rows of Yh (standard coordinates)
- \( \text{Fp} \) biplot markers of the rows of Yh (principal coordinates)
- \( \text{Gys} \) biplot markers for the y variables (standard coordinates)
- \( \text{Gyp} \) biplot markers for the y variables (principal coordinates)
- \( \text{Gxs} \) biplot markers for the x variables (standard coordinates)
- \( \text{Gxp} \) biplot markers for the x variables (principal coordinates)

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

References


See Also

- princomp
- cancor
- biplot

Examples

\[
X \leftarrow \text{matrix(rnorm(75),ncol=3)}
\]
\[
Y \leftarrow \text{matrix(rnorm(75),ncol=3)}
\]
\[
rda\text{.results} \leftarrow \text{rda}(X,Y)
\]
shiftvector  

Compute a shift vector for a calibrated axis.

Description

shiftvector computes two shift vectors perpendicular to the supplied biplot or scatterplot axis \( g \). The vector norm is computed from the two most extreme data points.

Usage

shiftvector(g, X, x = c(1, 0), verbose = FALSE)

Arguments

g a biplot or scatterplot axis
X a \( n \) by 2 matrix of scatterplot or biplot coordinates
x reference axis, \( (1,0) \) by default
verbose print information or not

Details

shiftvector locates the two most extreme datapoints in the direction perpendicular to axis \( g \).

Value

dr the right (w.r.t. the direction of \( g \)) shift vector
dl the left (w.r.t. the direction of \( g \)) shift vector

Author(s)

Jan Graffelman (jan.graffelman@upc.edu)

References


See Also
calibrate
Examples

```r
X <- matrix(rnorm(100), ncol=2)
Xs <- scale(X)

g <- c(1,1)

plot(Xs[,1], Xs[,2], asp=1, pch=19)
textxy(Xs[,1], Xs[,2], 1:nrow(X))

arrows(0,0,g[1],g[2])
text(g[1], g[2], "g", pos=1)

out <- shiftvector(g, X, verbose=TRUE)
dr <- out$dr
dl <- out$dl

arrows(0,0,dl[1],dl[2])
text(dl[1], dl[2], "dl", pos=1)

arrows(0,0,dr[1],dr[2])
text(dr[1], dr[2], "dr", pos=1)
```

---

**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**

```r
data(storks)
```

**Format**

A data frame containing 25 observations.

**Source**

Gabriel and Odoroff, Table 1.

**References**

**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, with labels fanning away from the origin.

**Usage**

```r
textxy(X, Y, labs, m = c(0, 0), cex = 0.5, offset = 0.8, ...)
```

**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
- `m`: coordinates of the origin of the plot (default (0,0))
- `cex`: character expansion factor
- `offset`: controls the distance between the label and the point. A value of 0 will plot labels on top of the point. Larger values give larger separation between point and label. The default value is 0.8
- `...`: additional arguments for function `text`.

**Value**

`NULL`

**Author(s)**

Jan Graffelman (jan.graffelman@upc.edu)

**References**


**See Also**

`text`

**Examples**

```r
x <- rnorm(5)
y <- rnorm(5)
plot(x, y, xlab = "x", ylab = "y")
textxy(x, y, labels = 1:5, offset = 0.8)
```

```r
textxy(x, y, 1:5, m = c(mean(x), mean(y)))
```
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