Package ‘munfold’

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Type Package
Title Metric Unfolding
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Description Multidimensional unfolding using Schoenemann's algorithm for metric and Procrustes rotation of unfolding results.
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procrustes  

Procrustes Rotation

Description

procrustes performs procrustes rotation, at the moment only of unfold solutions.

Usage

procrustes(x, ...)

## S3 method for class 'unfolding'
procrustes(x, use=attr(x,"procrustes_use"), target, ...)

Arguments

- **x**: an object the components of which to rotate.
- **use**: which of the components of x should be used as criterion for rotation.
- **target**: a matrix to which the rotation criterion should be brought as close as possible.
- **...**: further arguments for future methods, currently ignored.

Value

a copy of x with components appropriately rotated.

unfold  

Metric Unfolding

Description

unfold computes a metric unfolding solution based on a rectangular matrix, that is, reconstructs two sets of points from the distances between points of the first set and the points of the second set. `apply` applies a function the two point sets that are reconstructed by `unfold`.

Usage

unfold(x,...)

## S3 method for class 'matrix'
unfold(x, ndims=NULL, squared=FALSE, tol=1e-7, method=c("Schoenemann", "CG"), ...)

## S3 method for class 'formula'
unfold(x,data=parent.frame(), ...)
Arguments

x for `unfold.matrix`: a rectangular matrix that contains distances or squared distances (if argument `squared` is `TRUE`). For `unfold.formula`: a formula which specifies the variables that form the columns of the matrix of distances. For `biplot.unfolding` and `plot.unfolding`: an object that contains an unfolding solution.

data a data frame or an environment that contains variables specified in the formula given as first argument.

ndims an optional integer value that specifies the dimensionality of the solution. If `NULL` the dimensionality is selected automatically based on a singular value decomposition of the matrix of squared distances.

squared a logical value; does the matrix `D` contain squared distances?

tol a tolerance value for the convergence of the conjugate gradients method.

method a method for the iterative computation of the unfolding solution.

y a dummy argument for compatibility with default methods, ignored.

dimen for `biplot`: a two-element integer vector; for `plot`: a single integer value, that specifies the dimension(s) of the unfolding solution to be plotted.

type a character vector of length less than or equal to 2. Determines how each of the two point sets of the unfolding solutions are represented in the biplot. Valid choices are

- "points" the respective set of points are plotted as points in the biplot.
- "lines" the points of the respective set are connected by lines.
- "both" the points of the respective set are plotted as points and connected by lines.
- "text" the points of the respective set are represented by the corresponding row names and, if argument `tpos` is present, by points.
- "density" contour lines are drawn of two-dimensional kernel density estimate for the respective set of points. This biplot type uses the function `kde2d` of library `MASS`.
Unfold first computes an unfolding solution according to Schoenemann's metric unfolding algorithm that uses only linear algebra operations. This preliminary solution is then refined by minimizing the stress using a conjugate-gradients method.

uapply applies a given function to the two sets of points recovered by an unfolding solution. It applies the function to the components A and B of an object of class "unfolding".

Value

Unfold returns an object of class "unfolding" with components

A a numeric matrix representing the first set of points. Each row contains the coordinate of one point of the first set.
B a numeric matrix representing the second set of points. Each row contains the coordinate of one point of the second set.
fitted a numeric matrix that contains the fitted squared distances.
stress A stress value, denotes the "badness of fit".

Examples

r <- seq(from=0, to=2*pi, length=24)
a1 <- cos(r)*4 + 0.00001*runif(r)
a2 <- sin(r)*4 + 0.00001*runif(r)
b1 <- c(0.5,-0.5,-0.5,0.5)*3 + 5
b2 <- c(0.5,-0.5,-0.5,0.5)*3 + 1
D1 <- outer(b1,a1,"-")
D2 <- outer(b2,a2,"-")
Dsq <- D1^2+D2^2

Dsq.uf<-unfold(sqrt(Dsq), squared=FALSE)

oldpar <- par(mfrow=c(1,2))
A <- cbind(a1,a2)
B <- cbind(b1,b2)
ltype <- c(rep(1,NROW(A)),rep(2,NROW(A)))

orig <- rbind(A,B)
unfolded <- rbind(Dsq.uf$A,Dsq.uf$B)

xlim <- ylim <- range(orig)#*1.5

plot(A,type="b",pch=1,
    xlim=xlim,ylim=ylim,
    xlab="Dimension 1",ylab="Dimension 2",main=expression("Original data"),asp=1)
lines(B,type="b",pch=3,lty=2)
abline(h=0,v=0,lty=3)

biplot(Dsq.uf,type="b",
    xlim=xlim,ylim=ylim,
    main=expression(paste(italic(unfold)," solution")),asp=1)

par(oldpar)
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