Package ‘DendSer’

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Title Dendrogram Seriation: Ordering for Visualisation

Description Re-arranges a dendrogram to optimize visualisation-based cost functions.
The methods implemented here are described in ``Advances in Dendrogram Seriation for Application
to Visualization'', Journal of Computational and Graphical Statistics (2015) D. Earle and C.B. Hurley <doi:10.1080/10618600.2013.874295>.

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RoxygenNote 7.3.3

Imports gclus, graphics, seriation, stats, utils

Suggests HSAUR2, Iyer517, RColorBrewer, mvtnorm, scagnostics, knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation yes

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Contents

`cost` *Cost functions for DendSer Each of these functions evaluates the cost of an ordering.*

Description

Cost functions for DendSer Each of these functions evaluates the cost of an ordering.

Usage

```
costLS(sw, o, target = seq_along(sw), ...)

costARc(sw, o, target = nrow(sw) - 1, ...)

costED(sw, o, node, se, ...)

costPL(sw, o, ...)

costLPL(sw, o, target = (nrow(sw) - 1):1, ...)

costBAR(sw, o, target = max(2, floor(nrow(sw)/5)), ...)
```

Arguments

`sw`	For cost=costLS, this is a vector of object weights. Otherwise is a symmetric matrix.
`o`	An ordering vector.
`target`	Parameter used by cost function.
`...`	Other args.
`node`	The node
`se`	Extra info

Value

Result of cost

Author(s)

Catherine Hurley & Denise Earle

`crit2cost` *Cost function from seriation criterion*

Description

Returns a cost function from seriation criterion (package seriation)

Usage

```
crit2cost(crit)
```

Arguments

`crit`	One of seriation::list_criterion_methods("dist")

Examples

```
d<- dist(iris[1:20,-5])
h <- hclust(d)
DendSer(h,d,cost=function(x,o,...) seriation::criterion(as.dist(x),o,method="AR_deviations"))
DendSer(h,d,cost=crit2cost("AR_deviations")) # short version of above
DendSer(h,d,cost=crit2cost("ME"))

# use DendSer methods via seriate
# seriation::get_order(seriate(d,method="Dendser", control=list(hclust=h,cost=costARc)))
DendSer(h,d, cost=costARc)
```

`DendSer` *Implements dendrogram seriation*

Description

Implements dendrogram seriation.

Usage

```
DendSer(
  h,
  ser_weight,
  cost = costBAR,
  node_op = NULL,
  costArg = NULL,
  maxloops = NULL,
  saveinfo = FALSE,
  direction = NULL,
  GW = NULL,
  ...
)
```

Arguments

`h`	An object of class hclust
`ser_weight`	Used by cost function to evaluate ordering. For cost=costLS, this is a vector of object weights. Otherwise is a dist or symmetric matrix.
`cost`	Function used to evaluate permutation.Current choices are costLS, costPL, costLPL, costED, costARc, costBAR.
`node_op`	Function used to reorder branches at a dendrogram node. DendSer picks default depending on cost function. NULL means use default depending on cost.
`costArg`	Other args for cost function.
`maxloops`	Maximum number of iterations allowed. NULL means use default depending on cost.
`saveinfo`	Logical, whether info associated with search is saved.
`direction`	Order of visiting nodes. Values are "up" or "down", for nodes in order of increasing or decreasing height.NULL means use default depending on cost.
`GW`	Logical, initial GW step or not. NULL means use default depending on cost.
`...`	Not used.

Details

costED uses the Gruvaeus and Wainer 1972 algorithm, as provided by package gclus.

Value

Numeric vector giving an optimal dendrogram order

Author(s)

Catherine Hurley & Denise Earle

References

Gruvaeus, G. & Wainer, H. (1972), “Two additions to hierarchical cluster analysis”, British Journal of Mathematical and Statistical Psychology, 25, 200-206.

See Also

`dser`

Examples

```
d<- dist(iris[,-5])
h <- hclust(d,method="average")
ob<- DendSer(h,d)
opl<- DendSer(h,d,cost=costPL)
plotAsColor(d,ob)

w <- rowSums(iris[,-5])
ow <- DendSer(h,w,cost=costLS) # arranges cases by size, within hclust
stars(iris[ow,-5],labels=NULL, col.stars=cutree(h,3)[ow]) # and color by cluster
#stars(iris[ow,-5],labels=NULL, col.stars=iris[ow,5]) # or by species
```

`dser` *Implements dendrogram seriation. Interface to DendSer.*

Description

Implements dendrogram seriation. Interface to DendSer.

Usage

```
dser(x, ser_weight, cost = costBAR, ...)

## S3 method for class 'data.frame'
dser(x, ser_weight, cost = costBAR, ...)

## S3 method for class 'matrix'
dser(x, ser_weight, cost = costBAR, scale = TRUE, dmethod = "euclidean", ...)

## S3 method for class 'dist'
dser(x, ser_weight, cost = costBAR, hmethod = "average", ...)

## S3 method for class 'hclust'
dser(x, ser_weight, cost = costBAR, ...)
```

Arguments

`x`	Used to select method.
`ser_weight`	Seriation weights. For cost=costLS, defaults to first column of matrix x, otherwise to symmetric matrix version of dist d.
`cost`	Current choices are costLS, costPL, costLPL, costED, costARc, costBAR.
`...`	Other args
`scale`	Logical value,controls whether matrix x should be scaled prior to forming dist.
`dmethod`	Method of dist calculation. See function `dist`.
`hmethod`	Method of hclust calculation. See function `hclust`.

Details

When x is a matrix or data.drame, forms a dist of rows using function dist with method = dmethod. When x is a dist, forms a hclust with method = hmethod which is then reordered.

Value

Numeric vector giving an optimal dendrogram order

Methods (by class)

- `dser(data.frame)`: dser method
- `dser(matrix)`: dser method
- `dser(dist)`: dser method
- `dser(hclust)`: dser method

Author(s)

Catherine Hurley & Denise Earle

Examples

```
iriss <- scale(iris[,-5])
plotAsColor(iriss,order.row=dser(iriss))



w <- prcomp(iris[,-5],scale=TRUE)$x[,1]
h<- hclust(dist(iriss))
h$order <- ow <- dser(h,w,cost=costLS) # arranges cases along first PC, within dendrogram


# compare re-rordered dendrogram to PC scores, w
dev.new(width=10,height=5)
par(mar=c(0,2,1,1))
layout(matrix(1:2, nrow = 2), heights = c(4,1.5) )
```

```
par(cex=.7)
plot(h,main="",xlab="",hang=-1,labels=FALSE)
u <- par("usr")
par(mar=c(1,2,0,1))


plot.new()
par(usr=c(u[1:2],min(w),max(w)))

x<- 1:length(w)
rect(x-.5,0,x+.5,w[ow],col=cutree(h,3)[ow]+1)
```

`plotAsColor` *Function that plots a matrix as a color image*

Description

Function that plots a matrix as a color image, in matrix order.

Usage

```
plotAsColor(
  m,
  order = NULL,
  order.col = order,
  order.row = order,
  rank = FALSE,
  border.color = "grey70",
  labels = FALSE,
  x = 1:ncol(d),
  y = 1:nrow(d),
  ...
)
```

Arguments

`m`	Numeric matrix.
`order`	Default order used for rows and columns.
`order.col`	Column order.
`order.row`	Row order
`rank`	Logical, whether matrix m should be converted to ranks or not.
`border.color`	Color of border. Null for no border.
`labels`	If TRUE, add labels obtained from m.
`x`	X coordinates, passed to `image`.
`y`	Y coordinates, passed to `image`.
`...`	passed to `image`.

See Also

See Also as `image`.

Examples

```
d<- dist(scale(iris[,-5]))
plotAsColor(d,dser(d,hmethod="average"))
```

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