Package ‘dave’

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Type Package

Title Functions for ``Data Analysis in Vegetation Ecology''

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Description A collection of functions accompanying the book ``Data Analysis in Vegetation Ecology''. 3rd ed. CABI, Oxfordshire, Boston.

License LGPL (>= 2.0)

LazyData true

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NeedsCompilation no

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R topics documented:

`aocc` *Analysis of concentration (AOC)*

Description

Given a two-dimensional matrix of vegetation data the function derives a contingency table of counts (scores presenc-absence transformed) based on input classification of rows (the vegetation releves) and columns (the species). The cells of the contingency table are then adjusted to equal weight, followed by correspondence analysis (`cca`). Concentration of counts is measured and an ordination plotted.

Usage

```
aocc(veg, o.rgr, o.sgr,...)
aoc(veg, o.rgr, o.sgr)

## Default S3 method:
aocc(veg, o.rgr, o.sgr,...)
## S3 method for class 'aocc'
plot(x,...)
```

Arguments

`veg`	A data frame of vegetation releves (rows) by species (columns)
`o.rgr`	Group membership of rows given upon input
`o.sgr`	Group membership of columns given upon input
`x`	An object of class "aocc"
`...`	Further variables used for plotting

Details

These input parameters are typically generated by functions clust() and cutree() in the cluster package. See example below.

Value

An output list of class "aocc" with at least the following items:

`rgrscores`	Ordination scores of releve groups
`sgrscores`	Ordination scores of species groups
`eigvar`	Eigenvalues of correspondence analysis
`grand.total`	Grand total of contingency table
`MSCC`	Mean square contingency coefficient, a measure of concentration
`new.relorder`	Order of rows after ordering groups according to 1. axis
`new.sporder`	Order of columns after ordering groups according to 1. axis
`cont.table`	The contingency table

Note

The analysis of lattice structure, described in some of the references, is not included in this function.

Author(s)

Otto Wildi

References

Feoli, E. & Orloci, L. 1979. Analysis of concentration and detection of underying factors in structured tables. Vegetatio 40: 49-54.

Orloci, L. & Kenkel, N. 1985. Introduction to Data Analysis. International Co-operative Publ. House, Burtonsville, MD.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# First, groups of releves are formed
require(vegan)
dr<- vegdist(nveg^0.5,method="bray")      # dr is distance matrix of rows
o.clr<- hclust(dr,method="ward.D2")          # this is clustering
o.rgr<- cutree(o.clr,k=3)                 # 3 row groups formed
# Now I group the columns of nveg (the species)
# the same way as for rows
ds<- vegdist(t(nveg^0.25),method="euclid")
o.cls<- hclust(ds,method="ward.D2")
o.sgr<- cutree(o.cls,k=4)                  # 4 column groups formed

o.aocc<- aocc(nveg,o.rgr,o.sgr)
plot(o.aocc)                               # double scatter plot
                                           # 3 row-, 4 column goups as points.

# If cluster analysis is not used but classification is input by row and
# column to be processed by aocc():
o.rgr<- c(1,2,1,3,2,3,1,2,3,1,3)
o.sgr<- c(1,1,2,2,1,3,4,3,1,1,1,3,3,1,1,4,4,4,4,1,3)
o.aocc<- aocc(nveg,o.rgr,o.sgr)
plot(o.aocc)
```

---

ccost — *Cost function of 2 alternative classifications of rows in vegetation data*

Description

Given 2 alternative classifications (g groups) of rows in a data frame of vegetation data, confusion matrix, C, is derived first. Using the first classification a matrix of row centroids is derived (using function `centroid`) of wich a g by g distance matrix, W, is computed (correlation transformed to distance). Cost factor, cf, is the sum of element by element multiplication of C and W respectively, cf=sum(CW).

Usage

```
ccost(veg, oldgr, newgr, y,...)
ccost2(veg,oldgr, newgr, y)

## Default S3 method:
ccost(veg, oldgr, newgr, y,...)
## S3 method for class 'ccost'
print(x,...)
```

Arguments

veg	A data frame of vegetation releves (rows) by species (columns)
oldgr	Initial classification, e.g., derived by hclust()
newgr	Final classification, e.g., result of a model
y	Transformation of species scores: x'= x exp(y)
x	An object of class "ccost"
...	Further variables used for printing

Details

Cost factor cf has range 0 (both classifications identical) to n (number of rows), where n is the worst case of misclassification.

Value

An output list of class "ccost" with at least the following intems:

dimension	Dimension of confusion matrix (n by n)
ccost	Cost factor, cf
old.groups	Initial classification
new.groups	Final classification
conf.matrix	Confusion matrix
weight.matrix	Weigth matrix
transf	Transformation applied to scores, y-value

Author(s)

Otto Wildi

References

Ripley, B. D. 1996. Pattern recognition and neural networks. Cambridge: Cambridge University Press.

Venables, W. N. & Ripley, B. D. 2010. Modern applied statistics with S. Fourth Edition. Springer, NY.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# First, groups of releves are formed by cluster analysis
require(vegan)
dr<- vegdist(nveg^0.5,method="bray")      # dr is distance matrix of rows
o.clr<- hclust(dr,method="ward")          # this is clustering
oldgr<- cutree(o.clr,k=3)                 # 3 row groups formed
oldgr                                     # this displays initial classification:
# 2  4  6  9 10 18 25 27 39 49 50
# 1  2  1  3  2  3  1  2  3  1  3

# For simplicity we assume that row "2" and "50" change memebership:
newgr<- c(2,2,1,3,2,3,1,2,3,1,1)
o.ccost<- ccost(nveg,oldgr,newgr,y=0.5)           # does square root transformation
# Default method releasing cf
o.ccost                                           # displays C and W (see above)
```

---

centroid *Centroids of row groups (vegetation releves)*

Description

Given a two-dimensional data frame or matrix of vegetation data and group membership of rows (releve classification) a new matrix is derived with relative species frequency (0 to 1 scale) within groups. The matrix of centroids has as many rows as there are row groups in the vegetation matrix and the same number of columns (species).

Usage

```
centroid(nveg, grel,y,...)

## Default S3 method:
centroid(nveg, grel,y,...)
## S3 method for class 'centroid'
print(x,...)
```

Arguments

nveg	A data frame of vegetation releves (rows) by species (columns)
grel	A vector containing group membership of releves (rows), typically generated by hclust and cutree
y	Transformation of species scores: x'= x exp(y)
...	Further variables used for printing
x	A list of class "centroid" generated by centroid

Value

An output list of class "centroid" with at least the following items:

`nrelgroups`	Number of rows of centroid table
`nspec`	Number of columns of centroid table
`freq.table`	A table of species frequencies within groups, unadjusted
`prob.table`	A table of species frequencies within groups, adjusted (0-1)
`dist.mat`	An nrelgroups by nrelgroups distance matrix of centroids

Note

In function Mtabs() buit in as summary method

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# This generates a typical artificial vegetation data frame aveg
v1<- matrix(rep(0,200),nrow=10)
diag(v1)<-1 ; diag(v1[,2:12])<-1 ; diag(v1[,3:13])<-2 ; diag(v1[,4:14])<-1
diag(v1[,5:15])<-1 ; diag(v1[5:8,3:6])<-3 ; aveg<- data.frame(v1[,2:13])

# First, groups of releves are formed by cluster analysis
require(vegan)
dr<- vegdist(aveg^0.5,method="bray")      # dr is distance matrix of rows
o.clr<- hclust(dr,method="ward")          # this is clustering
grel<- cutree(o.clr,k=3)                  # 3 row groups formed
o.centroid<- centroid(aveg,grel,y=0.5)
o.centroid                                # printing the matrix
```

`dave` *Data Analysis in Vegetation Ecology*

Description

A collection of function accompaining the book "Data Analysis in Vegetation Ecology". These are mainly multivariate methods explained in the book but not found elsewhere. The package also includes all the data sets used in the book.

Details

Package:	dave
Type:	Package
Version:	2.0
Date:	2017-10-10
License:	LGPL <= 2.0

The use of all functions included is explained in "Data Analysis in Vegetation Ecology" (see reference below). Version 2.0 includes various new data frames, sspft and ssind, plant functional types and indicator values respectively to be used in conjunction with sveg. Also new is a somewhat longer time series, sn7veg and sn7sit and the new "Vraconnaz" time series in vrveg and vrsit.

Author(s)

Otto Wildi, otto.wildi@wsl.ch

References

Wildi, O. 2013. Data Analysis in Vegetation Ecology. 2nd ed. Wiley-Blackwell, Chichester.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# A typical and probably the most complex function is Mtab() that re-arranges
# the rwos and columns within a vegetation data frame and through plotting it
# illustrates the presumably emerging pattern:
y.r<- 0.5 ; y.s<- 0.2                # defining transformations used
k.r <- 3 ; k.s <- 4                  # row- and column numbers
ndiffs <- 18                         # no. of columns used to show pattern
o.Mt<-Mtabs(nveg,"mulva" ,y.r,y.s,k.r,k.s,ndiffs)
plot(o.Mt,method="normal")
# to see the original order simply replace "mulva" by "raw"
```

---

davesil — *Modified version of silhouette plotting*

Description

This is a wrapper for function `silhouette` in the cluster package. It also relies on the output of `hclust` and `cutree`.

Usage

```
davesil(ddist, o.hclr, o.relgr, ...)
dsil(ddist, o.hclr, o.relgr)

## Default S3 method:
```

```
davesil(ddist, o.hclr, o.relgr, ...)
## S3 method for class 'davesil'
plot(x,...,range=NULL)
```

Arguments

`ddist`	A distance matrix, probably the same as used for clustering
`o.hclr`	Output object of function hclust()
`o.relgr`	Output object of function cutree()
`...`	Plot parameter range(a,b) can be specified to limit plot to the subsed specified by a (begin) and b (end).
`x`	An object of class "davesil"
`range`	A vector of length 2, allows to plot a portion of the silhouette, e.g., range=c(1,5) plots the first 5.

Details

See function `silhouette` in the cluster package.

Value

An output list of class "davesil" with at least the following items:

`sil`	Data for drawing the silhouette, computed by silhouette()
`names`	The names of the items clustered, first 15 characters, used for plotting

Author(s)

Otto Wildi

References

Rousseeuw, P.J. (1987). Silhouettes: A graphical aid to the interpretation and validation of cluster analysis. J. Comput. Appl. Math., 20: 53-65.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# An oridinary cluster analysis
ddr<- as.dist((1-cor(t(nveg)))/2)         # distance matrix, correlation as distance
o.hclr<- hclust(ddr,method="complete")
o.relgr<- cutree(o.hclr,k=3)
# Getting silhouette plot
o.davesil<- davesil(ddr,o.hclr,o.relgr)
plot(o.davesil)
```

`dircor` *Directional mantel correlation*

Description

Given a two-dimensional vegetation data frame and the x- and y-coordinates of the releves (the rows in the data frame) in geographical space, mantel correlation (function `mantel` in the vegan package) is evaluated at regular intervals of direction. Direction versus correlation is plotted including 95 percent confidence interval.

Usage

```
dircor(veg, x.axis, y.axis, step,...)
dircor2(veg, x.axis, y.axis, step = 5)

## Default S3 method:
dircor(veg, x.axis, y.axis, step,...)
## S3 method for class 'dircor'
plot(x,...)
```

Arguments

`veg`	A data frame of vegetation releves (rows) by species (columns)
`x.axis`	This is the x-coordinate in geographical space
`y.axis`	This is the y-coordinate in geographical space
`step`	The step length in degrees, used to draw the above mentioned function
`x`	An object of class "dircor"
`...`	Further variables used for printing

Details

The method presently uses correlation as distance, as.dist((1-cor(t(sveg^2.0)))/2), as distance measure for vegetation releves.

Value

An output list of class "dircor" with at least the following intems:

`steps`	The explicit steps used in degrees, 0 - 180 degrees
`mean.correlation`	Mantel correlation at each step
`lower.limit`	The lower confidence limits
`upper.limit`	The upper confidence limits

Note

Computation time is fairly long because function mantel() evaluates the confidence limits for each directional step between 0 and 180 degrees. See also `mantel` in the vegan package.

Author(s)

Otto Wildi

References

Legendre, P. & Fortin, M.-J. 1989. Spatial analysis and ecological modeling. Vegetatio 80: 107–138.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# vegetation data is taken from sveg
# the x- and y-axes are stored in object ssit
o.dircor<- dircor(sveg,ssit$x.axis,ssit$y.axis,step=40)
plot(o.dircor)
```

`EKs` *Swiss forest vegetation data base 1972, site information*

Description

Swiss forest vegetation data base 1972, site information. Vegetation data is in data frame `EKv`.

Usage

```
data(EKs)
```

Format

A data frame with 2533 observations on the following 11 variables.

`Autor` a factor with author names as levels

`Jahr` a numeric vector with year of survey

`Tabellennr.` a numeric vector

`Laufnr.` a numeric vector

`Gesellschaftsname` a factor with name of vegetation unit as levels

`Hoehe_u.M.` a numeric vector, elevation a.s.l.

`Neigung_in_Prozent` a numeric vector

`Exposition` a factor with exposure of plot as levels

`Y.Koordinate` y coordinate, a numeric vector

`X.Koordinate` x coordinate, a numeric vector

`EK.Gesellschaftsnr` number (label) of vegetation unit the releve belongs to, a numeric vector

Details

Classification used in 1972 is in variable "EK.Gesellschaftsnr"

Source

Ellenberg, H. & Kloetzli, F. 1972. Waldgesellschaften und Waldstandorte der Schweiz. Mitt. Eidgenoess. Forsch. anst. Wald Schnee Landsch. 48(4): 587–930.

Keller, W., Wohlgemuth, T., Kuhn, N., Schuetz, M. & Wildi, O. 1998. Waldgesellschaften der Schweiz auf floristischer Grundlage. Mitteilungen der Eidgenoessischen Forschungsanstalt fuer Wald, Schnee und Landschaft (WSL) 73, Vol. 2.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(EKs)
```

EKv *Swiss forest vegetation data base 1972, vegetation information*

Description

Swiss forest vegetation data base 1972, vegetation information. Site data is in data frame `EKs`.

Usage

```
data(EKv)
```

Format

A data frame with 2533 observations on 1259 species, the variables on a numerical scale from 0 to 7.

Details

Old taxonomy, not updated.

Source

Ellenberg, H. & Kloetzli, F. 1972. Waldgesellschaften und Waldstandorte der Schweiz. Mitt. Eidgenoess. Forsch. anst. Wald Schnee Landsch. 48(4): 587–930.

Keller, W., Wohlgemuth, T., Kuhn, N., Schuetz, M. & Wildi, O. 1998. Waldgesellschaften der Schweiz auf floristischer Grundlage. Mitteilungen der Eidgenoessischen Forschungsanstalt fuer Wald, Schnee und Landschaft (WSL) 73, Vol. 2.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(EKv)
```

---

fitmarkov *Approximating a Markov chain*

Description

Given a vegetation data frame considerd a time series with releves as rows and species as columns transition matrices are derived vor each time step based on some simple assumptions. These are averaged and a model series is derived trough scalar products. Time steps are given in a separate vector t. Missing steps are properly processed.

Usage

```
fitmarkov(veg, t, adjust = FALSE, ...)
rfitmarkov(veg, t, adjust)

## Default S3 method:
fitmarkov(veg, t, adjust = FALSE, ...)
## S3 method for class 'fitmarkov'
plot(x,...)
```

Arguments

veg	This is a vegetation data frame, releves are rows, species columns
t	The time step scale of length according with rows in x
x	An object of class "fitmarkov"
adjust	A logical vector adjusting the sum of species scores to 1.0. Default is adjust=FALSE
...	Vector colors of any length for line colors, vector widths for line widths. See example below.

Details

This method yields a possible solution for fitting a Markov series. The true process may be very different.

Value

An output list of class "fitmarkov" with at least the following intems:

- `fitted.data` The fitted time series'
- `raw.data` The input time series'
- `transition.matrix` The mean transition matrix'
- `t.measured` The time steps upon input where time steps may be missing'
- `t.modeled` The time steps upon output, no missing steps'

Note

The aim of this method is to provide a smooth curve based on input data. Because this relies on incomplete information, it is just one out of many solutions.

Author(s)

Otto Wildi

References

Orloci, L., Anand, M. & He, X. 1993. Markov chain: a realistic model for temporal coenosere? Biom. Praxim 33: 7-26.

Lippe, E., De Smitt, J.T. & Glenn-Lewin, D.C. 1985. Markov models and succession: a test from a heathland in the Netherlands. Journal of Ecology 73: 775-791.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# data frame ltim is Lippe's data (see references)
# ltim just contains the time scale of the same
o.fm<- fitmarkov(lveg,ltim$Year)
plot(o.fm)
```

`fspa` *Flexible shortest path adjustment*

Description

Flexible shortest path adjustment is a heuristic ordination method attempting to adjust pattern to ecological situations. It erases long distances in the resemblance matrix and replaces these by the sum of intermediate steps. Subsequent ordination uses function `pco`.

Usage

```
fspa(veg, method, d.rev, n.groups, ...)
fspa2(veg,method,d.rev=0.5,n.groups=3)

## Default S3 method:
fspa(veg, method, d.rev, n.groups, ...)
## S3 method for class 'fspa'
plot(x,...,axes=c(1,2))
```

Arguments

`veg`	A data frame of vegetation releves (rows) by species (columns)
`method`	The method used for calculating distance as available in function vegdist of package vegan, for instance method = "bray".
`d.rev`	The percentage of distances revised, for instance 0.5 (50 percent, the default).
`n.groups`	This classifies the data points for illustrative purposes (uses Ward's method).
`...`	Variable axes=c(1,2) (default), the axes to be plotted
`x`	An object of class "fspa".
`axes`	A vector of length two, assessing the axes used for plotting. Default is c(1,2).

Value

An output list of class "fspa" with at least the following intems:

`oldpoints`	Ordination scores before adjustment
`newpoints`	Ordination scores after adjustment
`symbols`	The symbols used for classified plot
`nline`	The number of lines to be drawn in the graph
`startline`	Coordinates where the lines start
`endline`	Coordinates where the lines end
`dmat.before`	Distance matrix before analysis
`dmat.after`	Distance matrix after analysis
`endline`	Coordinates where the lines end
`d.rev`	proportion of distances revised

Author(s)

Otto Wildi

References

Bradfield, G.E. & Kenkel, N.C. 1987. Nonlinear ordination using flexible shortest path adjustment of ecological distances. Ecology 68: 750–753.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.fspa<- fspa(sveg,method="euclid",d.rev=0.75,n.groups=6)  # sveg is vegetation data
plot(o.fspa,axes=c(1,2))                                    # plots axis 1, 2
```

---

ltim *Lippe et al. 1985 data set, yr of observation*

Description

Lippe et al. 1985 data set, yr of observation. Vegetation data is in data frame lveg.

Usage

```
data(ltim)
```

Format

A data frame with 19 observations on the following variable.

Year a numeric vector containing the year of sampling

Source

Lippe, E., De Smitt, J.T. & Glenn-Lewin, D.C. 1985. Markov models and succession: a test from a heathland in the Netherlands. Journal of Ecology 73: 775–791.

Orloci, L., Anand, M. & He, X. 1993. Markov chain: a realistic model for temporal coenosere? Biom. Praxim 33: 7–26.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ltim)
```

lveg *Lippe et al. 1985 data set, vegetation data*

Description

Lippe et al. 1985 data set, vegetation data. Year of observation is in data frame `ltim`.

Usage

```
data(lveg)
```

Format

A data frame with 19 observations on the following 9 variables, the species.

`open.soil` a numeric vector

`Empetrum.nigrum` a numeric vector

`Calluna.vulgaris` a numeric vector

`Erica.tetralix` a numeric vector

`Molinia.coerulea` a numeric vector

`Carex.pilulifera` a numeric vector

`Juncus.squarrosus` a numeric vector

`Rumex.acetosella` a numeric vector

`other.species` a numeric vector

Source

Lippe, E., De Smitt, J.T. & Glenn-Lewin, D.C. 1985. Markov models and succession: a test from a heathland in the Netherlands. Journal of Ecology 73: 775–791.

Orloci, L., Anand, M. & He, X. 1993. Markov chain: a realistic model for temporal coenosere? Biom. Praxim 33: 7–26.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(lveg)
```

Mtabs *Structuring vegetation data tables*

Description

Mimics traditional manual ordering of vegetation data table by (i) clustering rows and columns (hclust), (ii) rearranging the resulting groups according to the first AOC axis (aocc), (iii) rearranging rows and columns inside groups based on CA (cca), (iv) Putting high resolving species on top of the table (aoc). Also offers variants for ordering.

Usage

```
Mtabs(veg, method = "raw", y.r, y.s, k.r, k.s, ndiffs, ...)
mtab(veg, method = "raw", y.r, y.s, k.r, k.s, ndiffs)
plottab(veg,rorder=NULL,sorder=NULL,grr=NULL,grs=NULL,y=0.5)
plottabl(veg,rorder=NULL,sorder=NULL,grr=NULL,grs=NULL,y=0.5)
setgroupsize(vec)

## Default S3 method:
Mtabs(veg, method, y.r, y.s, k.r, k.s, ndiffs, ...)
## S3 method for class 'Mtabs'
plot(x,...,method="normal")
## S3 method for class 'Mtabs'
summary(object,...,range=NULL)
```

Arguments

veg	This is a vegetation data frame, releves are rows, species columns
method	The method used for ordering: "raw", "sort", "ca", "clust", "aoc" or "mulva"
y.r	Transformation of species scores when clustering releves (rows): x'= x exp(y.r)
y.s	Transformation of species scores when clustering species (columns): x'= x exp(y.s)
k.r	The number of releve groups
k.s	The number of species groups
ndiffs	The number of (high resolving) species used for top portion of the table
...	Use method="normal" for conventional display, "compressed" for very large tables
rorder	The order of releves (rows) for printing
sorder	The order of species (columns) for printing
grr	The group labels of releves (rows) for printing
grs	The group labels of species (columns) for printing
x	An object of class "Mtabs"
object	An object of class "Mtabs"

range	A subset of species to be displayed in summary table, e.g., c(1,10) for the first 10.
vec	A vector of group labels, analyzed similar to function table(), but without sorting
y	Transformation of species scores: x'= x exp(y)

Details

Function plottab() and plottabl() are for internal use only

Value

An object of class "Mtabs" with at least the following items:

method	The method used for ordering
transf.r	Argument y.r
transf.s	Argument y.s
order.rel	The resulting order of rows
order.sp	The resulting order of columns
order.relgr	The resulting order of releve groups
order.spgr	The resulting order of species groups
MSCC	Mean square contingency coefficient
CAeig.rel	Eigenvalues of correspondence analysis
AOCeig.rel	Eigenvalues of analysis of concentration
veg	The input vegetation data frame
centroids	The matrix of groups centroids (see summary.Mtabs

Note

This extremely complex procedure accords with conventions used in vegetation ecology. It assumes that the vegetation data frame has many zero entries (plots in which species are not found). The summary method displays a frequency table (relative frequency of all species within the releve groups, `centroid`).

Author(s)

Otto Wildi

References

Wildi, O. 1989. A new numerical solution to traditional phytosociological tabular classification. Vegetatio 81: 95–106.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
y.r<- 0.5 ; y.s<- 0.2                  # defining transformations used
k.r <- 3 ; k.s <- 4                    # row- and column numbers
ndiffs <- 18                           # no. of columns used to show pattern
o.Mt<-Mtabs(nveg,"mulva" ,y.r,y.s,k.r,k.s,ndiffs)
plot(o.Mt,method="normal")
# to see the original order simply replace "mulva" by "raw"
```

---

mveg *Ellenberg's 1956 meadow data*

Description

Ellenberg's 1956 meadow data. No site factors available.

Usage

```
data(mveg)
```

Format

A data frame with 25 observations on the 94 species, the variables (cover percentages). Species names are abbreviations.

Details

No site factors available for this data frame.

Source

Mueller-Dombois, D. & Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology. John Wiley & Sons, New York, Chichester, Brisbane, Toronto.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(mveg)
```

mxplot *Matrixplot of groups similarities*

Description

This calclulates and plots average similarities of rows (releves) in a square, classified matrix. Correlation coefficient is used as similarity, upon plotting proportionas to the surface of circles. Hence, diagonal elements exhibit similarity of groups, off-diagonals all similarities to the remaining groups.

Usage

```
mxplot(veg, rmember, use, y=1, ...)
matrixplot(veg, rmember, use, y=1)

## Default S3 method:
mxplot(veg, rmember, use, y=1,...)
## S3 method for class 'mxplot'
plot(x,...,capacity=100)
```

Arguments

veg	This is a vegetation data frame, releves are rows, species columns
rmember	Group membership of the rows or columns, typically taken from cluster analysis
use	Either "rows" or "columns"
y	Transformation of species scores: x'= x exp(y)
...	Capacity. Adjusts plot size to the number of groups.
x	An object of class "mxplot"
capacity	The number of group symbols that fit on one page

Details

The distance measure used is "correlation used as distance". See reference.

Value

An object of class "mxplot" with at least the following items:

order	Dimension of the similarity matrix (equal to the number of groups ng)
mmatrix	The ng x ng matrix of average group similarity
levels	The ng group names (a vector of character variables)

Note

Plot parameter capacity only affects the format of plot. Just try.

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# Starts with classifying releves by cluster analysis
dd<- vegdist(sveg^0.5,method="euclid")        # dd is distance matrix
o.clust<- hclust(dd,method="ward")            # clustering
groups<- as.factor(cutree(o.clust,k=6))       # forming 6 groups

o.mxpl<- mxplot(sveg,groups,use="rows",y=0.5)
plot(o.mxpl,capacity=30)
```

---

nsit — *European beach forest data, site factors*

Description

European beach forest data, site factors. Vegetation information is in data frame nveg.

Usage

```
data(nsit)
```

Format

A data frame with 11 observations on the following 8 site variables.

`PH` a numeric vector

`ALTITUDE` a numeric vector

`SLOPE.deg` a numeric vector

`X.AXIS` a numeric vector

`Y.AXIS` a numeric vector

`EXPOSURE` a factor with levels `E` `N` `S`

`YEAR` a numeric vector

`GROUP_NO` a numeric vector

Details

Artificial data

Source

Wildi, O. & Orloci, L. 1996. Numerical Exploration of Community Patterns. 2nd ed. SPB Academic Publishing, The Hague.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(nsit)
```

---

nveg *European beach forest data, vegetation*

Description

European beach forest data, vegetation. Site factors are in data frame `nsit`.

Usage

```
data(nveg)
```

Format

A data frame with 11 observations on the following 21 species, the variables (0 to 6 scale used).

`Fagus.silvatica` a numeric vector

`Quercus.petraea` a numeric vector

`Acer.pseudoplatanus` a numeric vector

`Fraxinus.excelsior` a numeric vector

`Lonicera.xylosteum` a numeric vector

`Sambucus.racemosa` a numeric vector

`Sambucus.nigra` a numeric vector

`Vaccinium.myrtillus` a numeric vector

`Carex.silvatica` a numeric vector

`Oxalis.acetosella` a numeric vector

`Viola.silvestris` a numeric vector

`Luzula.nemorosa` a numeric vector

`Veronica.officinalis` a numeric vector

`Galium.odoratum` a numeric vector

`Lamium.galeobdolon` a numeric vector

`Primula.elatior` a numeric vector

`Allium.ursinum` a numeric vector

`Arum.maculatum` a numeric vector

`Ranunculus.ficaria` a numeric vector

`Eurhynchium.striatum` a numeric vector

`Polytrichum.formosum` a numeric vector

Details

Artificial data

Source

Wildi, O. & Orloci, L. 1996. Numerical Exploration of Community Patterns. 2nd ed. SPB Academic Publishing, The Hague.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(nveg)
```

---

orank *Ranking by orthogonal components (RANK)*

Description

Given a correlation matrix of rows or columns this selects the variable sharing a maximum variance with all others and declares this rank 1. Reduces the matrix (covariances, correlations) by the contribution of the variable ranked first. Repeats the process to derive consecutive ranks until no variance is left.

Usage

```
orank(veg, use, rlimit=5, y=1, x.axis=NULL, y.axis=NULL,...)
orank1(veg, use, rlimit=5, y=1, x.axis=NULL, y.axis=NULL)

## Default S3 method:
orank(veg, use, rlimit=5, y=1, x.axis=NULL, y.axis=NULL,...)
## S3 method for class 'orank'
plot(x,...)
## S3 method for class 'orank'
summary(object,...)
```

Arguments

`veg`	This is a vegetation data frame, releves are rows, species columns
`use`	Either "rows" or "columns"
`rlimit`	The maximum number of ranks to be determined
`y`	Transformation of species scores: x'= x exp(y)
`x.axis`	Horizontal axis used for plotting result in a sampling plan
`y.axis`	Vertical axis used for plotting result in a sampling plan
`x`	An object of class "orank"
`...`	Further variables used for printing
`object`	An object of class "orank"

Details

If x-axis=NULL or y-axis=NULL then a pcoa-ordination is computed and the first two axes used for plotting

Value

An object of class "orank" with at least the following items:

`use`	Either "rows" or "columns"
`n.ranks`	The number of ranks
`var.names`	Names of the ranked variables
`var.explained`	Explained variance of the ranked variables
`var.percent`	Percentage of the variance explained
`cum.var`	Cummulative variance of ranked variables, percentage
`x.axis`	The same as input parameter x.axis
`y.axis`	The same as input parameter y.axis

Note

The present function exclusively relies on a correlation matrix, function `cor`.

Author(s)

Otto Wildi

References

Orloci, L. 1973. Ranking characters by a dispersion criterion. Nature 244: 371–373.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# Uses vegetation data frame sveg with vegetation data
# and ssit with corresponding x- and y-axes scores
x.axis=ssit$x.axis ; y.axis=ssit$y.axis
o.orank<- orank(sveg,use="rows",rlimit=5,y=0.25,x.axis,y.axis)
plot(o.orank)
```

---

outlier *Outlier detection*

Description

Identifies outliers based on the nearest neighbour criterion. It starts by computing a matrix of distances (correlation, r, used as distance, dr=(1-r)/2). Variables with nearest neighbour distance larger than parameter thresh are considered outliers.

Usage

```
outlier(veg, thresh, y,...)
outly(veg, thresh = 0.2, y = 0.5)

## Default S3 method:
outlier(veg, thresh, y,...)
## S3 method for class 'outlier'
plot(x,...)
## S3 method for class 'outlier'
print(x,...)
```

Arguments

`veg`	This is a vegetation data frame, releves are rows, species columns
`thresh`	Threshold nearest neighbour distance for outliers
`y`	Transformation of species scores: x'= x exp(y)
`x`	An object of class "outlier"
`...`	Parameter out.seq, the plotting interval

Value

An object of class "oulier" with at least the following items:

`threshold`	Threshold nearest neighbour distance for considering outliers
`y`	Transformation of species scores: x'= x exp(y)
`rel.names`	All row names
`neigh.names`	Names of the corresponding nearest neighbours
`neigh.dist`	Distance to the nearest neighbour

`olddim`	Dimensions of data frame veg
`newdim`	Dimensions of data frame with outliers erased
`new.data`	Vegetation data frame without outliers
`pco.points`	The pco ordination scores use for plotting

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.outlier<- outlier(nveg,thresh=0.2,y=0.5)
o.outlier                                   # a list of all variables
plot(o.outlier)                             # nearest neighbour histogram and
                                            # pco ordination
```

`overly` *Overly of multivariate time series*

Description

This function attempts to superimpose (overlay) multivariate time series that typically stem from different locations to form one single series. Series are combined pairwise following the arrangement in a minimum spanning tree, `spantree`. The result is a time series which may be longer than the contributing series, but shorter than their length total.

Usage

```
overly(veg, Plot.no, y, sint, ...)
overly2(veg, Plot.no, y, sint)

## Default S3 method:
overly(veg, Plot.no, y, sint, ...)
## S3 method for class 'overly'
plot(x,...,colors=NULL,l.widths=NULL)
```

Arguments

`veg`	This is a vegetation data frame, releves are rows, species columns. It is assumed that it constitutes two or more time series
`Plot.no`	Plot names. Rows with identical name are assumed to belong to the same time series.
`y`	Transformation of species scores: x'= x exp(y)

`sint`	Length of time interval. Affects display only.
`...`	Parameters colors=NULL, l.width=NULL, colors and line widths in plots.
`colors`	A vector of colors, such as c(1,2,3). The entries are recycled upon printing.
`l.widths`	A vector of line widths used for plotting, e.g., c=(0.5,1,1.5,2).The entries are recycled upon printing.
`x`	An object of class "overly"

Details

In plant ecology this procedure is also known as space-for-time substitution. See also `pco`,`spantree`.

Value

An object of class "overly" with at least the following items:

`plot.labels`	Names of plots, see Plot.no above
`n.tseps`	The resulting (synthetic) number of time steps
`tseps`	A vector of time steps in time units
`tser.data`	The resulting vegetation time steps
`ord.scores`	The pco scores of the ordination of time series
`d.mat`	Euclidean distance matrix of time series
`vegraw`	Input vegetation data frame veg (see above)
`linex1`	Starting address of the time series in the synthetic time frame
`linex2`	End address of the time series in the synthetic time frame
`ltex`	The plot names
`sint`	The time interval (see above)
`vegtypes`	The species names involved

Author(s)

Otto Wildi

References

Wildi, O. and Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25–32. Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.overly<- overly(sn59veg,sn59sit$Plot.no,y=0.5,sint=5)
# Plotting (i) minimum spanning tree, (ii) temporal arrangement of time series,
# (iii) synthetic multivariate time series
plot(o.overly,colors=NULL,l.width=NULL)
```

pcaser *Connecting time series in ordinations*

Description

Given a vegetation data frame containing various time series this plots a pca-ordination (pca) and connects points belonging to the same series with lines. The plots where the releves come from are identified by plotlabels (see below).

Usage

```
pcaser(veg, plotlabels, y, ...)
pcaser2(veg, plotlabels, y=1)

## Default S3 method:
pcaser(veg, plotlabels, y, ...)
## S3 method for class 'pcaser'
plot(x,lines=TRUE,arrows=TRUE,...)
```

Arguments

veg	This is a vegetation data frame, releves are rows, species columns
plotlabels	Plot names. Rows with identical name are assumed to belong to the same time series.
y	Transformation of species scores: x'= x exp(y)
...	Parameter lines=TRUE will connect the series. Otherwise they are distinguished by symbols used in plot only.
x	An object of class "pcaser".
lines	A logical variable. When TRUE then points of the same time series are connected.
arrows	A logical variable. When TRUE then the first and the last points of the same time series are connected.

Value

An object of class "pcaser" with at least the following items:

comp1	Description of 'comp1'
nrel	Total number of releves involved (i.e., row number)
nser	Total number of time series (i.e., locations where the data stem from
scores	The pca-ordination scores
plotlab	Plot labels used for plotting
plotlabels	Plot names
Eigv	Eigenvalues (percentage)

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.pcaser<- pcaser(sn6veg,sn6sit$Plot.no,y=0.25)
plot(o.pcaser,lines=TRUE)
```

---

pcobiplot — *Computing and plotting a biplot ordination using principal coordinates analysis*

Description

Computing a principal coordinates analysis of releves (rows, see pco) and subsequently the correlations with all species (columns). Two ordinations are plotted, one for releves and an arrow-plot for species. Species are restricted to the list given in sel.sp and species names are abbreviated upon request (see make.cepnames).

Usage

```
pcobiplot(veg, method, y = 1, ...)
pcocoor(veg, method, y = 1)

## Default S3 method:
pcobiplot(veg,method,y=1,...)
## S3 method for class 'pcobiplot'
plot(x,...,axes=c(1,2),sel.sp=NULL,shortnames=TRUE)
```

Arguments

veg	This is a vegetation data frame, releves are rows, species columns
method	The method used for calculating distance. See function vegdist(), package vegan.
y	Transformation of species scores: x'= x exp(y)
...	Plot parameters axes=c(1,2), sel.sp=NULL (species selection),shortnames=TRUE for abbreviation of species names
shortnames	A logical variable, when TRUE delivering shortnames of species (package vegan used).
axes	A vector of length two, assessing the axes used for plotting. Default is c(1,2).
x	An object of class "pcobiplot"
sel.sp	The species (column numbers) to be included in the plot of arrows

Value

An object of class "pcobiplot" with at least the following items:

- `nrel` The number of releves
- `nspe` The number of species
- `rpoints` Ordination scores of releves
- `spoints` Ordination scores of species
- `allspnames` The full list of species names

Note

If sel.sp is not specified a random selection of 6 species is taken

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
sel.sp<- c(3,11,23,31,39,46,72,77,96)                    # selection of species
o.pcobiplot<- pcobiplot(sveg,method="bray",y=0.25)       # used pco
plot(o.pcobiplot,sel.sp=sel.sp,axes=c(1,2),shortnames=TRUE)  # plot of releves, sepecies
```

---

pcovar *Plotting 6 variants of principal coordinates analysis*

Description

Plotting 6 ordinations using euclidean distance, manhattan distance, chord distance, Canberra distance, Bray-Curtis distance (`vegdist`) and correlation as distance respectively. Transformation of scores can be adjusted according to x'= x exp(y). All ordinations (`pco`) superimposed to PCA solution (`pca`) by `procrustes` analysis.

Usage

```
pcovar(veg, y, ...)
pcoatest(veg, y=1)

## Default S3 method:
pcovar(veg, y, ...)
## S3 method for class 'pcovar'
plot(x,...,reversals=c(0,0,0,0,0,0))
```

Arguments

veg	A vegetation data frame, releves are rows, species columns
y	Transformation of species scores: x'= x exp(y)
...	Additional plot paramteters, see par.
reversals	Vector reversals=c(0,0,0,0,0,0). When set to 1 the corresponding plot is mirrored vertically.
x	An object of class "pcovar".

Details

pco, vegdist, procrustes for the main functions used

Value

An object of class "pcovar" with at least the following items:

nrel	The number of releves
nspec	The number of species
y	Transformation of species scores: x'= x exp(y)
euclidpca	PCA coordinates, euclid used, adjusted by procrustes analysis
euclidpco	PCO coordinates, euclid used, adjusted by procrustes analysis
manhpco	PCO coordinates, manhattan used, adjusted by procrustes analysis
manhpca	PCA coordinates, manhattan used, adjusted by procrustes analysis
cordpco	PCO coordinates, chord distance used, adjusted by procrustes analysis
cordpca	PCA coordinates, chord distance used, adjusted by procrustes analysis
canpco	PCO coordinates, canberra dist. used, adjusted by procrustes analysis
canpca	PCA coordinates, canberry dist. used, adjusted by procrustes analysis
bpco	PCO coordinates, Bray-Curtis dist. used, adjusted by procrustes analysis
bpca	PCA coordinates, Bray-Curtis dist. used, adjusted by procrustes analysis
corpco	PCO coord., correlation as dist. used, adjusted by procrustes analysis
corpca	PCA coord., correlation as dist. used, adjusted by procrustes analysis

Note

This function serves primarily instructional purposes

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.pcovar<- pcovar(sveg,y=1)
plot(o.pcovar,reversals=c(0,0,0,0,0,0))
```

---

psit *Time scale (yr) for Soppensee pollen data*

Description

Time scale (yr) for Soppensee pollen data. See details below. Vegetation is in data frame pveg.

Usage

```
data(psit)
```

Format

A data frame with 145 observations on the following variable.

`Years.B.P` a numeric vector

Details

Time scale (no corrections applied for revised 14C calibration).

Source

Lotter, A.F. 1999. Late-glacial and Holocene vegetation history and dynamics as shown by pollen macrofossil analyses in annually laminated sediments from Soppensee, central Switzerland. Vegetation History and Archaeobotany 8: 165-184.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(psit)
```

pveg — *Soppensee pollen data*

Description

Soppensee pollen data. Vegetation only (tree species). The age (year B.P) is in psit.

Usage

```
data(pveg)
```

Format

A data frame with 145 observations on the following 14 variables.

- `X1.Abies` a numeric vector
- `X2.Pinus` a numeric vector
- `X3.Fagus` a numeric vector
- `X4.Quercus` a numeric vector
- `X5.Acer` a numeric vector
- `X6.Fraxinus` a numeric vector
- `X7.Ulmus` a numeric vector
- `X8.Tilia` a numeric vector
- `X9.Betula` a numeric vector
- `X10.Alnus` a numeric vector
- `X11.Populus` a numeric vector
- `X12.Salix` a numeric vector
- `X13.Sorbus` a numeric vector
- `X14.Picea` a numeric vector

Source

Lotter, A.F. 1999. Late-glacial and Holocene vegetation history and dynamics as shown by pollen macrofossil analyses in annually laminated sediments from Soppensee, central Switzerland. Vegetation History and Archaeobotany 8: 165-184.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(pveg)
```

sn59sit *Time series from the Swiss National Park, 59 plots. Site data.*

Description

Time series from the Swiss National Park, 59 plots. Site data: Plot names and yr of sampling. Vegetation data in sn59veg.

Usage

```
data(sn59sit)
```

Format

A data frame with 751 observations on the following 2 variables.

`Plot.no` a factor with 59 levels, the plot names

`Year` a numeric vector

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sn59sit)
```

sn59veg *Time series from the Swiss National Park, 59 plots. Vegetation data.*

Description

Time series from the Swiss National Park, 59 plots. Vegetation data. Variables are species guilds. Site data is in sn59sit.

Usage

```
data(sn59veg)
```

Format

A data frame with 751 observations on the following 6 variables (the species guilds).

`Aconitum` a numeric vector

`Trisetum` a numeric vector

`Deschampsia` a numeric vector

`Festuca` a numeric vector

`Carex` a numeric vector

`Pinus` a numeric vector

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sn59veg)
```

`sn6sit` *Time series from the Swiss National Park, 6 plots. Site data.*

Description

Time series from the Swiss National Park, 6 plots. Site data: Plot names and yr of sampling. Vegetation data in `sn6veg`.

Usage

```
data(sn6sit)
```

Format

A data frame with 81 observations on the following 2 variables.

`Plot.no` a factor with levels `Ac9` `FN2` `MU21` `N8` `PF1` `Pin3`

`Year` a numeric vector

Details

A subset of data frame sn59sit

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sn6sit)
```

---

sn6veg *Time series from the Swiss National Park, 6 plots. Vegetation data.*

Description

Time series from the Swiss National Park, 6 plots. Vegetation data. Plot names are in `sn6sit`.

Usage

```
data(sn6veg)
```

Format

A data frame with 81 observations on the following 6 variables (species guilds), cover percentage.

`Aconitum` a numeric vector

`Deschampsia` a numeric vector

`Trisetum` a numeric vector

`Festuca` a numeric vector

`Carex` a numeric vector

`Pinus` a numeric vector

Details

A subset of data frame sn59veg

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sn6veg)
```

---

sn7sit *Time series from the Swiss National Park, 7 plots. Site data.*

Description

Time series from the Swiss National Park, 7 plots. Site data: Plot names and yr of sampling. Vegetation data in sn7veg.

Usage

```
data("sn7sit")
```

Format

A data frame with 97 observations on the following 2 variables.

`Plot.no` a factor with levels `Ac9` `FN2` `MU21` `N8` `PF1` `Pin3` `Tr6`

`Year` a numeric vector

Details

A subset of data frame sn59sit

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
data(sn7sit)
str(sn7sit)
```

sn7veg *Time series from the Swiss National Park, 6 plots. Vegetation data.*

Description

Time series from the Swiss National Park, 6 plots. Vegetation data. Plot names are in `sn6sit`.

Usage

```
data("sn7veg")
```

Format

A data frame with 97 observations on the following 6 variables (species guilds).

`Aconitum` a numeric vector

`Deschampsia` a numeric vector

`Trisetum` a numeric vector

`Festuca` a numeric vector

`Carex` a numeric vector

`Pinus` a numeric vector

Details

A subset of data frame sn59veg

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
data(sn7veg)
str(sn7veg)
```

SNPsm *The spatial and temporal model of succession in the Swiss National Park*

Description

A dynamic model of succession on alp Stabelchod in the Swiss Nationl Park using differential equations and numerial integration. 6 species guilds are considered. Space is conceived as a grid of 30 times 40 cells. Typical simulation time is around 500yr.

Usage

```
SNPsm(trange,tsl,diff,r6,...)
SNPsm2(trange=100,tsl=5.0,diff=0.001,r6=NULL)

## Default S3 method:
SNPsm(trange, tsl, diff, r6, ...)
## S3 method for class 'SNPsm'
plot(x, ...,out.seq=1,col=FALSE)
```

Arguments

`trange`	Time range of simulation in yr
`tsl`	Time range of simulation in yr
`out.seq`	Time interval (yr) at which maps of the state are printed
`diff`	A diffusion coefficient driving random spatial propagation
`r6`	Growth rates of 6 guilds involved, increase in cover percentage per yr
`...`	Parameter out.seq, the plotting interval
`x`	An object of class "SNPsm"
`col`	A logical variable to suppress color printing

Value

An object of class "SNPsm" with at least the following items:

`n.time.steps`	Number of time steps used for numerical integration
`imax`	Vertical grid count
`jmax`	Horizontal grid count
`time.step.length`	The time step length in yr
`veg.types`	The names of the vegetation types, i.e., the species
`vegdef`	A nspecies x nspecies matrix defining composition of vegetation types
`growth.rates`	The growth rates given upon input

sim.data	Simulated scores of all species (guilds) during simulation time
tmap	The 30 x 40 grid map of types used as initial condition
igmap	The same as tmap
frame	A 30 x 40 grid showing initial forest edges, used for printing

Author(s)

Otto Wildi

References

Wildi, O. 2002. Modeling succession from pasture to forest in time and space. Community Ecology 3: 181–189.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
r6=NULL          # imposes default growth rates
o.stSNP<- SNPsm(trange=100,tsl=10.0,diff=0.001,r6)
plot(o.stSNP,out.seq=50)
```

SNPtm *The temporal model of succession in the Swiss National Park*

Description

A dynamic model of succession in the Swiss Nationl Park using differential equations and numerial integration. 6 species guilds are considered. Typical simulation time is around 500yr.

Usage

```
SNPtm(trange, tsl, x6, r6,...)
SNPtm2(trange, tsl, x6, r6)

## Default S3 method:
SNPtm(trange, tsl, x6, r6,...)
## S3 method for class 'SNPtm'
plot(x,...)
```

Arguments

trange	Time range of simulation in yr
tsl	Time step length used for integration (no. of yr)
x6	Initial conditions of 6 guilds involved, cover percentage
r6	Growth rates of 6 guilds involved, increase in cover percentage per yr
x	An object of class "SNPtm"
...	Parameter out.seq, the plotting interval

Value

An object of class "SNPtm" with at least the following items:

- `n.time.steps` Time step range covered by the model
- `time.step.length` Time step length used for integration, no. of yr
- `time vector` All time steps described by the results
- `veg.types` The names of the vegetation types, i.e., the species
- `growth.rates` The growth rates given upon input
- `initial.cond` Initial conditions of 6 guilds involved, cover percentage
- `sim.data` Simulated scores of all species (guilds) during simulation time

Author(s)

Otto Wildi

References

Wildi, O. 2002. Modeling succession from pasture to forest in time and space. Community Ecology 3: 181–189.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
o.SNPtm<- SNPtm(trange=400,tsl=1.0,x6=NULL,r6=NULL)
plot(o.SNPtm)
```

---

speedprof *Plotting velocity profiles of multivariate time series*

Description

From a multivariate time series of vegetation data this first computes a distance matrix (`vegdist`, euclidean). The first plot is a graphical representation of the full distance matrix, the second a profile of change per time step of different length (velocity).

Usage

```
speedprof(veg, timescale, orders, y = 1, adjust,...)
speedprof2(veg, timescale, orders, y = 1, adjust)

## Default S3 method:
speedprof(veg, timescale, orders, y = 1, adjust,...)
## S3 method for class 'speedprof'
plot(x,...)
```

Arguments

`veg`	This is a vegetation data frame, releves are rows, species columns. Releves are considered a time series.
`timescale`	A vector of points in time of releves (rows)
`orders`	Orders used for printing the velocity profile, i.e., the number of time steps used for calculating speed (rate of change per time unit).
`y`	Transformation of species scores: x'= x exp(y)
`adjust`	Parameter adjust=TRUE re-scales releves to vector sum=100 percent (assuming cover
`x`	An object of class "speedprof".
`...`	Parameter out.seq, the plotting interval

Value

An object of class "SNPsm" with at least the following items:

`nrel`	The number of releves
`dmatrix`	The distance matrix
`timescale`	The time scale
`orders`	Time step lengths considered for plotting the profile

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
orders<- c(1,2,3,4)
o.spp<- speedprof(tveg,tsit$Year,orders,y=1.0,adjust=TRUE)
plot(o.spp)
```

`srank` *Ranking species by IndVal or F-value*

Description

Given a vegetation data frame with grouped rows (releves) indicator value analysis (funcion `indval`) or analysis of variance (`aoc`) is performed on columns (species) and these are ordered by decreasing IndVal (function indval()) or F-value (aov()) accordingly.

Usage

```
srank(veg, groups, method, y,...)
srank2(veg,groups,method,y)

## Default S3 method:
srank(veg, groups, method, y,...)
## S3 method for class 'srank'
print(x,...)
```

Arguments

`veg`	This is a vegetation data frame, releves are rows, species columns
`groups`	Group membership of rows (releves)
`method`	Either "indval" or "jancey"
`y`	Transformation of species scores: x'= x exp(y)
`...`	Further variables used for printing
`x`	A list of class "srank" generated by centroid

Value

An object of class "srank" with at least the following items:

`rank`	A sequence of numbers, 1,2,3,...,p where p= number of species
`species.no`	The corresponding species no. (i.e. the column no.
`species`	The corresponding species names (taken from column names
`Indval`	The corresponding indicator values (method "indval")
`F_value`	The corresponding F-values (method "jancey")
`error.probability`	The corresponding error probabilities

Author(s)

Otto Wildi

References

Jancey, R.C. 1979. Species ordering on a variance criterion. Vegetatio 39: 59–63.

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
# Starts with classifying releves by cluster analysis
dd<- vegdist(nveg^0.5,method="euclid")         # dd is distance matrix
o.clust<- hclust(dd,method="ward")             # clustering
groups<- as.factor(cutree(o.clust,k=3))        # forming 3 groups
```

```
# Applies ranking and prints ordered table of species (the columns)
o.srank<- srank(nveg,groups,method="jancey",y=0.5)
o.srank
```

---

ssind *Indicator values of all species in data set "sveg"*

Description

For each species in "sveg" all 8 indicator values are taken from the "Flora Indicativa by" Landolt et al. (2010). These are ranks on a 1 to 5 scale (except for M), but for some indicators half steps are used as well. Scores zero (0) are either undefined or unknown and must be treated as missing values

Usage

```
data(ssind)
```

Format

A data frame with 119 observations on the following 9 variables.

- `T` Temperature value (1-5, 9 steps)
- `K` Continentality value (1-5, 5 steps)
- `L` Light value (1-5, 5 steps)
- `F` Moisture value (1-5, 5 steps)
- `W` Moisture availability (1-3, 3 steps)
- `R` Reaction value (acidity, 1-5, 5 steps)
- `N` Nutrient value (1-5, 9 steps)
- `H` Humus value (1-3, 3 steps)
- `D` Soil aeration value (1-3, 3 steps)

Details

Indicator values from vascular plants and brypphytes stem from different lists in Landolt et al. (2010). Note that this data set was not in cluded in the original dave package, but added in version 1.5 only.

Source

Landolt, E., Baeumler, B., Erhardt, A., Hegg, O., Kloetzli, F., Laemmler, W., Nobis, M., Rudmann-Maurer, K., Schweingruber, F.H., Theurillat, J.-P., Urmi, E., Vust, M. and Wohlgemuth, T. 2010. Flora indicativa. Ecological Indicator Values and Biological Attributes of the Flora of Switzerland and the Alps. Haupt, Bern.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ssind)
```

`ssit` *Schlaenggli site data*

Description

Schlaenggli site data. 63 plots arranged in a square grid. Vegetation in data frame `sveg`.

Usage

```
data(ssit)
```

Format

A data frame with 63 observations on the following 20 site variables.

`pH.peat` a numeric vector
`log.ash.perc` a numeric vector
`Ca_peat` a numeric vector
`Mg_peat` a numeric vector
`Na_peat` a numeric vector
`K_peat` a numeric vector
`Acidity.peat` a numeric vector
`CEC.peat` a numeric vector
`Base.sat.perc` a numeric vector
`P.peat` a numeric vector
`Waterlev.max` a numeric vector
`Waterlev.av` a numeric vector
`Waterlev.min` a numeric vector
`log.peat.lev` a numeric vector
`log.slope.deg` a numeric vector
`pH.water` a numeric vector
`log.cond.water` a numeric vector
`log.Ca.water` a numeric vector
`x.axis` a numeric vector
`y.axis` a numeric vector

Source

Wildi, O. 1977. Beschreibung exzentrischer Hochmoore mit Hilfe quantitativer Methoden. Veroeff. Geobot. Inst. ETH, Stiftung Ruebel 60: 128S.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ssit)
```

`sspft` *Selected plant functional traits of all species in data set "sveg"*

Description

For each species in "sveg" a selction of 23 traits are taken from the "Flora Indicativa by" Landolt et al. (2010). These are all nominal variables. Score 1 indicates the trait is present, score 0 it is absent. Hence, there is no such things like missing values.

Usage

```
data(sspft)
```

Format

A data frame with 119 observations on the following 23 variables.

`LF.g` Life form "geophyte" (plants with resting buds below ground)

`LF.c` Life form "herbaceous" (herbaceous plant, buds on shoots above ground)

`LF.z` Life form "woody chamaephyte" (dwarf shrub, buds above ground)

`LF.p` Life form "phanerophyte" (woody shrub or tree, > 4m)

`LF.n` Life form "nanophanerophyte" (woody shrub or tree, < 4m)

`LF.a` Life form "hydrophyte" (plants with buds submerged)

`LF.h` Life form "hemicryptophyte" (buds on or directly below ground, rosettes, tussocks)

`LF.t` Life form "therophyte" (plant dying back, surviving as seed or annual hemicryptophyte)

`LF.hp` Life form "hemiparasite" (plant obtaining water and nutrients from host, green leaves)

`LF.k` Life form "short-lived hemicryptophyte" (resting buds near ground, hapaxantic species)

`LF.ff` Life form "carnivorous species" (consuming some nutrients from animals)

`LF.moss` Life form "moss" (in separate list of Landolt et al. 2010)

`LF.sph` Life form "Sphagnum" (all species of genus Sphagnum)

`FS.zw` Reproduction "hermaphrodictic, normal sexual" (pollination necessary to reproduce)

- `FS.cl` Reproduction "cleistogamouns" (normal flowers and self-pollinating)
- `FS.di` Reproduction "unisexual and dioceous" (only male or female organs)
- `FS.mo` Reproduction "unisexual and monoecious" (male, female and bisexual flowers on one plant)
- `FS.ve` Reproduction "polysexual" (male and/or female and bisexual flowers on one individual)
- `FS.fa` Reproduction "facultatively apomictic" (sexual and simultaneously asexual reproduction)
- `FS.oa` Reproduction "obligate apomictic" (mostly bisexual, fertilization necessary for reproduction)
- `c` Life strategy "competitive" (competitive, long-lived), range 1-3
- `r` Life strategy "ruderal" (pioneer species, short-lived), range 1-3
- `s` Life strategy "stress-tolerant" (adapted to harsh environmental conditions), range 1-3

Details

Species traits from vascular plants and brypphytes stem from different lists in Landolt et al. (2010). Note that this data set was not in cluded in the original dave package, but added in version 1.5 only.

Source

Landolt, E., Baeumler, B., Erhardt, A., Hegg, O., Kloetzli, F., Laemmler, W., Nobis, M., Rudmann-Maurer, K., Schweingruber, F.H., Theurillat, J.-P., Urmi, E., Vust, M. and Wohlgemuth, T. 2010. Flora indicativa. Ecological Indicator Values and Biological Attributes of the Flora of Switzerland and the Alps. Haupt, Bern.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sspft)
```

---

sveg — *Schlaenggli vegetation data*

Description

Schlaenggli vegetation data. 63 plots arranged in a square grid. Site factors in data frame `ssit`.

Usage

```
data(sveg)
```

Format

A data frame with 63 observations on 119 species as variables. Species abundance measured on a 0 to 6 scale.

Source

Wildi, O. 1977. Beschreibung exzentrischer Hochmoore mit Hilfe quantitativer Methoden. Veroeff. Geobot. Inst. ETH, Stiftung Ruebel 60: 128S.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(sveg)
```

---

tsit — *Time series from the Swiss National Park, Plot Tr6. Site data.*

Description

Time series from the Swiss National Park, plot Tr6. Site data: Plot names and yr of sampling. Vegetation is in `tveg`.

Usage

```
data(tsit)
```

Format

A data frame with 16 observations on the following 2 variables.

`Plot.no` a factor with levels `Tr6`

`Year` a numeric vector

Details

A subset of data frame `sn59sit`.

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
data(tsit)
## maybe str(tsit) ; plot(tsit) ...
```

tveg *Time series from the Swiss National Park, Plot Tr6. Vegetation data.*

Description

Time series from the Swiss National Park, Plot Tr6. Vegetation data. Site data is in `tsit`.

Usage

```
data(tveg)
```

Format

A data frame with 16 observations on the following 6 variables, the species guilds.

`Aconitum` a numeric vector

`Deschampsia` a numeric vector

`Trisetum` a numeric vector

`Festuca` a numeric vector

`Carex` a numeric vector

`Pinus` a numeric vector

Details

A subset of data frame sn59veg

Source

Wildi, O. & Schuetz, M. 2000. Reconstruction of a long-term recovery process from pasture to forest. Community Ecology 1: 25-32.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(tveg)
```

vrsit *Vraconnaz time series data, site factors and dates*

Description

A vegetation time series from 11 plots in the Vraconnaz peat bog, describing species invasion and propagation after a bog burst in 1986. The corresponding vegetation object is vrveg

Usage

```
data("vrsit")
```

Format

A data frame with 231 observations on the following 26 variables.

nom_de_lobjet a factor with levels La_Vraconnaz Vraconnaz

nom_de_la_releviste a factor with levels E.Feldmeyer ef EF KE

date a factor with levels 01.01.91 01.07.92 01.07.99 03.07.01 04.07.01 04.07.06 04.07.07 05.07.05 05.07.06 05.07.93 06.07.04 06.07.05 06.07.06 06.07.93 07.07.04 07.07.05 07.07.93 08.07.03 08.07.04 08.07.08 09.07.02 09.07.03 09.07.08 09.07.96 09.07.97 10.07.00 10.07.02 10.07.03 10.07.07 10.07.08 10.07.89 10.07.90 10.07.97 11.07.00 11.07.02 11.07.07 11.07.89 11.07.90 11.07.95 12.07.00 12.07.07 12.07.89 12.07.90 12.07.95 13.07.89 15.07.98 16.07.98 25.07.88 26.07.88 27.06.94 27.07.88 28.06.94 28.07.88 29.06.92 29.06.94 29.06.99 29.07.88 30.06.92 30.06.99

Jahr a numeric vector

No_du_releve a numeric vector

No_du_carre a numeric vector

surface_.m2. a numeric vector

recouvrement_muscinal a numeric vector

recouvrement_herbace a numeric vector

recouvrement_sous.arbore a numeric vector

recouvrement_arbore a numeric vector

litiere_seche a numeric vector

tourbe_nue a numeric vector

eau_libre a numeric vector

Artenzahl a numeric vector

Feuchtezahl a numeric vector

Lichtzahl a numeric vector

Temperaturzahl a numeric vector

Kontinentalitaetszahl a numeric vector

`Reaktionszahl` a numeric vector

`Naehrstoffzahl` a numeric vector

`Humuszahl` a numeric vector

`Dispersitaetszahl` a numeric vector

`X` a numeric vector

`Y` a numeric vector

`Z` a numeric vector

Details

For processing the data as time series only variable "Jahr" is used. There are 20 states in time resulting.

Source

Feldmeyer-Christe, E., Kuechler, M. and Wildi, O. 2011. Patterns of early succession on bare peat in a Swiss mire after a bog burst. Journal of Vegetation Science 22: 943-954.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
data(vrsit)
str(vrsit)
```

---

vrveg *Vraconnaz time series data, vegetation*

Description

A vegetation time series from 11 plots in the Vraconnaz peat bog, describing species invasion and propagation after a bog burst in 1986. The corresponding site object is `vrsit`

Usage

```
data("vrveg")
```

Format

A data frame with 231 observations on the following 154 variables (the species):

Agrostis_canina a numeric vector

Agrostis_capillaris a numeric vector

Agrostis_capillaris.1 a numeric vector

Agrostis_gigantea a numeric vector

Agrostis_stolonifera a numeric vector

Ajuga_reptans a numeric vector

Amblystegium_riparium a numeric vector

Angelica_sylvestris a numeric vector

Anthoxanthum_odoratum a numeric vector

Atrichum_undulatum a numeric vector

Aulacomnium_palustre a numeric vector

Betula_pubescens a numeric vector

Brachythecium_mildeanum a numeric vector

Brachythecium_mildeanum.1 a numeric vector

Brachythecium_rivulare a numeric vector

Brachythecium_rutabulum a numeric vector

Briza_media a numeric vector

Bryum_pseudotriquetrum a numeric vector

Calliergonella_cuspidata a numeric vector

Caltha_palustris a numeric vector

Campanula_rotundifolia a numeric vector

Campylium_stellatum a numeric vector

Cardamine_pratensis a numeric vector

Carex_canescens a numeric vector

Carex_davalliana a numeric vector

Carex_echinata a numeric vector

Carex_flava a numeric vector

Carex_hostiana a numeric vector

Carex_leporina a numeric vector

Carex_nigra a numeric vector

Carex_panicea a numeric vector

Carex_pauciflora a numeric vector

Carex_pulicaris a numeric vector

Carex_rostrata a numeric vector

Cerastium_caespitosum a numeric vector

Cerastium_fontanum a numeric vector

Cerastium_glomeratum a numeric vector

Ceratodon_purpureus a numeric vector

Cirriphyllum_piliferum a numeric vector

Cirsium_palustre a numeric vector

Climacium_dendroides a numeric vector

Cratoneuron_filicinum a numeric vector

Crepis_mollis a numeric vector

Crepis_paludosa a numeric vector

Crepis_paludosa.1 a numeric vector

Crocus_albiflorus a numeric vector

Ctenidium_molluscum a numeric vector

Dactylorhiza_fistulosa a numeric vector

Dactylorhiza_maculata a numeric vector

Danthonia_decumbens a numeric vector

Deschampsia_cespitosa a numeric vector

Drepanocladus_revolvens_aggr. a numeric vector

Drepanocladus_vernicosus.1 a numeric vector

Eleocharis_quinqueflora a numeric vector

Epilobium_angustifolium a numeric vector

Epilobium_montanum a numeric vector

Epilobium_montanum.1 a numeric vector

Epilobium_palustre a numeric vector

Epipactis_palustris a numeric vector

Equisetum_fluviatile a numeric vector

Equisetum_palustre a numeric vector

Eriophorum_angustifolium a numeric vector

Eriophorum_latifolium a numeric vector

Eurhynchium_speciosum a numeric vector

Festuca_arundinacea a numeric vector

Festuca_pratensis a numeric vector

Festuca_rubra_aggr. a numeric vector

Filipendula_ulmaria a numeric vector

Fissidens_adianthoides a numeric vector

Fragaria_vesca a numeric vector

Galeopsis_tetrahit a numeric vector

Galium_palustre a numeric vector

Galium_uliginosum a numeric vector

Geum_rivale a numeric vector

Homalothecium_nitens a numeric vector

Hypericum_maculatum a numeric vector

Juncus_acutiflorus a numeric vector

Juncus_alpinoarticulatus a numeric vector

Juncus_articulatus a numeric vector

Juncus_effusus a numeric vector

Lathyrus_pratensis a numeric vector

Leontodon_hispidus a numeric vector

Lophocolea_heterophylla a numeric vector

Lotus_corniculatus a numeric vector

Luzula_campestris a numeric vector

Luzula_multiflora a numeric vector

Melampyrum_pratense a numeric vector

Mnium_hornum a numeric vector

Molinia_caerulea a numeric vector

Myosotis_cespitosa a numeric vector

Myosotis_nemorosa a numeric vector

Myosotis_scorpioides a numeric vector

Myosoton_aquaticum a numeric vector

Parnassia_palustris a numeric vector

Pedicularis_palustris a numeric vector

Pellia_neesiana a numeric vector

Petasites_albus a numeric vector

Phragmites_communis a numeric vector

Picea_abies a numeric vector

Picea_excelsa a numeric vector

Pinguicula_vulgaris a numeric vector

Plagiomnium_affine_aggr. a numeric vector

Pleurozium_schreberi a numeric vector

Poa_pratensis a numeric vector

Poa_trivialis a numeric vector

Polygala_amarella a numeric vector

Polygonum_bistorta a numeric vector

Polytrichum_commune a numeric vector

Polytrichum_formosum a numeric vector

Polytrichum_strictum a numeric vector

Populus_tremula a numeric vector

Potentilla_erecta a numeric vector

Potentilla_palustris a numeric vector

Prunella_vulgaris a numeric vector

Ranunculus_acris a numeric vector

Ranunculus_auricomus a numeric vector

Rhinanthus_alectorolophus a numeric vector

Rhinanthus_minor a numeric vector

Rhytidiadelphus_squarrosus a numeric vector

Rhytidiadelphus_triquetrus a numeric vector

Riccardia_multifida a numeric vector

Rumex_acetosa a numeric vector

Salix_caprea a numeric vector

Salix_cinerea a numeric vector

Salix_cinerea_cf. a numeric vector

Salix_cinerea_.S a numeric vector

Salix_myrsinifolia a numeric vector

Salix_myrsinifolia_.S a numeric vector

Salix_purpurea a numeric vector

Salix_repens a numeric vector

Sanguisorba_officinalis a numeric vector

Scleropodium_purum a numeric vector

Silene_flos.cuculi a numeric vector

Stellaria_graminea a numeric vector

Stellaria_media a numeric vector

Succisa_pratensis a numeric vector

Swertia_perennis a numeric vector

Tomentypnum_nitens a numeric vector

Trichophorum_cespitosum a numeric vector

Trollius_europaeus_.cf. a numeric vector

Tussilago_farfara a numeric vector

Vaccinium_myrtillus a numeric vector

Vaccinium_uliginosum a numeric vector

Vaccinium_vitis.idaea a numeric vector

Valeriana_dioeca a numeric vector

Valeriana_officinalis a numeric vector

Valerianella_locusta a numeric vector

Veronica_beccabunga a numeric vector

Veronica_chamaedrys a numeric vector

Vicia_cracca a numeric vector

Viola_palustris a numeric vector

litiere_seche a numeric vector

tourbe_nue a numeric vector

eau_libre a numeric vector

Details

Note that this is a data frame whereas the corresponding time (years) is listed in vrsit.

Source

Feldmeyer-Christe, E., Kuechler, M. and Wildi, O. 2011. Patterns of early succession on bare peat in a Swiss mire after a bog burst. Journal of Vegetation Science 22: 943-954.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
data(vrveg)
str(vrveg)
```

---

vvelocity *Printing ordinations of velocity and acceleration and differently transformed speed profiles*

Description

Given a data frame of a multivariate (vegetation) time series this plots a pco ordination using circles with diameters proportional to rate of change (velocity), a pco ordination pco using cirlces with diameters proportional to change in velocity (acceleration) and three velocity profiles with differently transformed species scores (from quantitative to qualitative).

Usage

```
vvelocity(pveg, timescale, y, ...)
vvelocity2(pveg, timescale, y=1)

## Default S3 method:
vvelocity(pveg,timescale,y,...)
## S3 method for class 'vvelocity'
plot(x,tlabs,scal=1,...)
```

Arguments

`pveg`	A data frame of a multivariate (vegetation) time series
`timescale`	A vector of points in time of releves (rows)
`y`	Transformation of species scores: x'= x exp(y)
`...`	Additional arguments passed to plot.
`tlabs`	A vector of releve labels used for annotation of data points in ordinations. See example.
`scal`	A variable for scaling the circles in the ordinations. Default is scal=1.
`x`	An object of class "vvelocity".

Details

See also `pco` for the ordinations used.

Value

An object of class "vvelocity" with at least the following items:

`pveg`	The input vegetation data frame
`timescale`	The input time scale
`y`	Transformation of species scores: x'= x exp(y)

Author(s)

Otto Wildi

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
tlabs<- c(1,15,48,60,100,122,145)
timescale<- psit$Years.B.P
o.vvel<- vvelocity(pveg,timescale,y=0.5)
plot(o.vvel,tlabs=tlabs,scal=1)
```

wetsit *Random sample of Swiss wetland vegetation, site information.*

Description

Random sample of Swiss wetland vegetation, site information. Vegetation information is in wetveg. Note: this differs from the same file in the 2nd edition as 4 observations are erased and 16 new site factors added.

Usage

```
data(wetsit)
```

Format

A data frame with 1496 observations on the following 85 variables.

`EK2_Identifikation` a factor with levels identifying phytosociologica identity

`Flnr_ek1` a numeric vector, a plot number

`Flnr_ek2` a numeric vector, a plot number

`Area` a numeric vector, surface of plot

`ek` a numeric vector

`Objekt_Nr` a numeric vector

`Kanton` a factor with levels identifying canton

`Datum` a factor with levels for date of sampling

`Autor_Code` a factor with levels for author code

`Det_Code` a factor with levels of author initials

`Erhebung` a numeric vector, survey, mainly 1

`Torfmoose` a factor with levels for Sphagnum cover

`Uebrige_Moose` a factor with levels for cover of other mosses

`Zwergstraeucher` a factor with levels for cover of dwarf shrubs

`Straeucher` a factor with levels for cover of shrubs

`Baeume` a factor with levels for cover of trees

`Nekromasse` a factor with levels for cover of necro mass

`Offener_Torf` a factor with levels for cover of open turf

`Offener_Mineralboden` a factor with levels for mineral soil

`Offene_Wasserflaeche` a factor with levels for open water surface

`Stark_abgefressen` a factor with levels for browsing _ `Ja` `Nein`

`Kurz_geschnitten` a factor with levels for cutting _ `Ja` `Nein`

`X` a factor with levels for x-axis in space

Y a factor with levels for y-axis in space

Z a factor with levels for z-axis in space, elevation

humidity a numeric vector

light a numeric vector

temperature a numeric vector

continentality a numeric vector

reaction a numeric vector

nutrients a numeric vector

humus a numeric vector

dispersity a numeric vector

Assoziation1_ek1 a factor with levels for alliance names, first choice

Assoziation2_ek1 a factor with levels for alliance names, second choice

Assoziation3_ek1 a factor with levels for alliance names, third choice

X1._Wert_ek1 a numeric vector

X2._Wert_ek1 a numeric vector

X3._Wert_ek1 a factor with levels (rather than a numeric vector as above)

Differenz_Wert1.Wert2 a numeric vector

Unterverband1_ek1 a factor with names of sub-alliance as levels, first choice

Unterverband2_ek1 a factor with names of sub-alliance as levels, second choice

Verband1_ek1 a factor with names of alliances as levels, first choice

Verband2_ek1 a factor with names of alliances as levels, first choice

unklassierbar_verband a factor with levels _ ja

Unterordnung1_ek1 a logical vector

Unterordnung2_1ek1 a logical vector

Ordnung1_ek1 a factor with order as levels, first choice

Ordnung2_ek1 a factor with order as levels, second choice

unklassierbar_ordnung a factor with levels _ ja

Unterklasse1_ek1 a logical vector

Unterklasse2_ek1 a factor with levels Polygono-Poenea_annuae

Klasse1_ek1 a factor with class as levels, first choice

Klasse2_ek1 a factor with class as levels, second choice

BAFU.Gruppe1_ek1 a factor with vegetation type in german, first choice

BAFU.Gruppe2_ek1 a factor with vegetation type in german, second choice

Wirkungskontrolle1_ek1 a factor with vegetation type in german as levels

Wirkungskontrolle2_ek1 a factor with vegetation type in german as levels

Wirkungskontrolle_engl1_ek1 a factor with vegetation type in english as levels

Wirkungskontrolle_engl2_ek1 a factor with vegetation type in english as levels

Moor_j.n1_ek1 a factor with levels j n

Moor_j.n2_ek1 a factor with levels j n

Assoziation_Nr a numeric vector

Unterverband_Nr a numeric vector

Verband_Nr a numeric vector

Unterordnung_Nr a logical vector

Ordnung_Nr a numeric vector

Unterklasse_Nr a logical vector

Klasse_Nr a numeric vector

slp25_d8 a numeric vector

ddeg300 a numeric vector

precyy a numeric vector

sfroyy a numeric vector

tminall a numeric vector

sradyy a numeric vector

swb a numeric vector

mind7 a numeric vector

SOILTYPE a factor with levels identifying soil type

GRUNDIGKEI a numeric vector

SKELETT a numeric vector

WASSERSPEI a numeric vector

NAHRSTOFF a numeric vector

WASSERDURC a numeric vector

VERNASS a numeric vector

GT_ID a numeric vector

Source

Graf, U., Wildi, O., Feldmeyer-Christe, E. & Kuechler, M. 2010. A phytosociological classification of Swiss mire vegetation. Botanica Helvetica 120: 1-13.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(wetsit)
```

wetveg *Random sample of Swiss wetland vegetation, vegetation information.*

Description

Random sample of Swiss wetland vegetation, vegetation information. Site data is in wetsit. Note: this differs from the same used in the 2nd edition in that 4 observations and 1 variable are erased.

Usage

```
data(wetveg)
```

Format

A data frame with 1496 observations on 1163 variables, the species. A 0 to 4 step scales is used.

Source

Graf, U., Wildi, O., Feldmeyer-Christe, E. & Kuechler, M. 2010. A phytosociological classification of Swiss mire vegetation. Botanica Helvetica 120: 1-13.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(wetveg)
```

ws200 *Four kilometre grid forest data of Switzerland, 200m2 plots*

Description

Four kilometre grid forest data of Switzerland, 200m2 plots. Also see ws30, ws500. Site information is in wssit.

Usage

```
data(ws200)
```

Format

A data frame with 726 observations on 1262 variables, the species.

Details

See object wssit for corresponding site information

Source

Wohlgemuth, T., Moser B., Braendli, U.-B., Kull, P. & Schuetz, M. 2008. Diversity of forest plant species at the community and landscape scales in Switzerland. Plant Biosystems 142: 604-613.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ws200)
```

`ws30` *Four kilometre grid forest data of Switzerland, 30m2 plots*

Description

Four kilometre grid forest data of Switzerland, 30m2 plots. Also see ws200, ws500. Site information is in `wssit`.

Usage

```
data(ws30)
```

Format

A data frame with 726 observations on 1262 variables, the species.

Details

See object wssit for corresponding site information

Source

Wohlgemuth, T., Moser B., Braendli, U.-B., Kull, P. & Schuetz, M. 2008. Diversity of forest plant species at the community and landscape scales in Switzerland. Plant Biosystems 142: 604-613.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ws30)
```

ws500 — *Four kilometre grid forest data of Switzerland, 500m2 plots*

Description

Four kilometre grid forest data of Switzerland, 500m2 plots. Also see ws30, ws200. Site information is in `wssit`.

Usage

```
data(ws500)
```

Format

A data frame with 726 observations on 1262 variables, the species.

Details

See object wssit for corresponding site information

Source

Wohlgemuth, T., Moser B., Braendli, U.-B., Kull, P. & Schuetz, M. 2008. Diversity of forest plant species at the community and landscape scales in Switzerland. Plant Biosystems 142: 604-613.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(ws500)
```

wssit — *Four kilometre grid forest data of Switzerland, site information*

Description

Four kilometre grid forest data of Switzerland, site information. Also see `ws30`, `ws200` and `ws500` for vegetation data.

Usage

```
data(wssit)
```

Format

A data frame with 726 observations on the following 18 variables.

`x.coord` a numeric vector

`y.coord` a numeric vector

`hoehe` a numeric vector

`elev` a numeric vector

`slp` a numeric vector

`ddeg.0` a numeric vector

`prcp.yy` a numeric vector

`sfro.yy` a numeric vector

`tave.cc` a numeric vector

`srad.yy` a numeric vector

`swb` a numeric vector

`min7` a numeric vector

`s.depth` a numeric vector

`s.wcap` a numeric vector

`s.nutrient` a numeric vector

`s.wperm` a numeric vector

`s.wetn` a numeric vector

`pH.LFI` a numeric vector

Details

Corresponding vegetation data is in ws30, ws200 and ws500 respectively.

Source

Wohlgemuth, T., Moser B., Braendli, U.-B., Kull, P. & Schuetz, M. 2008. Diversity of forest plant species at the community and landscape scales in Switzerland. Plant Biosystems 142: 604-613.

References

Wildi, O. 2017. Data Analysis in Vegetation Ecology. 3rd ed. CABI, Oxfordshire, Boston.

Examples

```
summary(wssit)
```

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