Package ‘dynRB’

July 6, 2022

Type Package
Title Dynamic Range Boxes
Version 0.17
Date 2022-07-06
Author Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>,
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,
Robert R. Junker <Robert.R.Junker@sbg.ac.at>,
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,
Arne Bathke <Arne.Bathke@sbg.ac.at>,
Judith H. Parkinson <judith.parkinson@sbg.ac.at>,
Raoul Kutil <Raoul_Hugo.Kutil@stud.sbg.ac.at>
Maintainer Thimo Kasper <thimo.kasper@plus.ac.at>
Description Improves the concept of multivariate range boxes, which is highly susceptible for outliers and does not consider the distribution of the data. The package uses dynamic range boxes to overcome these problems.
Imports corrplot, RColorBrewer, ggplot2, reshape2, vegan, foreign, dplyr
Suggests testthat, knitr, rmarkdown
VignetteBuilder knitr
License GPL-2
NeedsCompilation no
Repository CRAN
Date/Publication 2022-07-06 12:40:01 UTC

R topics documented:

dynRB-package .................................................. 2
dynRB_Pn ..................................................... 3
dynRB_Vn ..................................................... 4
dynRB_VPa .................................................... 5
finch .......................................................... 6
dynRB-package

Dynamic Range Boxes

Description
The package DynRB improves the concept of multivariate range boxes, which is highly susceptible for outlines and does not consider the distribution of the data. The package uses dynamic range boxes to overcome these problems.

Details

Package: dynRB
Type: Package
Version: 0.16
Date: 2021-05-11

Author(s)
Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>,
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,
Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author),
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,
Arne Bathke <Arne.Bathke@sbg.ac.at>,
Judith H. Parkinson <judith.parkinson@sbg.ac.at>,
Raoul Kutil <Raoul_Hugo.Kutil@stud.sbg.ac.at>

References


Examples
# example function dynRB_VPa
# for reliable results use steps = 201
data(finch2)
r<-dynRB_VPa(finch2, steps = 101)
r$result

---

dynRB_Pn

**Pairwise overlaps for each dimension**

### Description

Function returns pairwise overlaps for each dimension $n$. Number of dynamic range boxes ($steps$) can be adjusted. Default: $steps = 201$

### Usage

dynRB_Pn(A = A, steps = 201, correlogram = FALSE, row_col = c(2, 2))

### Arguments

- **A**: Data frame, where the first column is a character vector containing the objects (e.g. species) and the other columns are numeric vectors (containing measurements).
- **steps**: Number of range boxes. Default: $steps = 201$
- **correlogram**: If TRUE, the correlogram for each species is shown. If FALSE, no correlogram is shown. Default: correlogram = FALSE
- **row_col**: Number of rows and columns of the figures (correlogram for each species). Default: row_col = c(2, 2)

### Value

Data frame containing the summarized overlaps for each pair of objects and dimension.

### Author(s)

Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>, Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>, Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author), Jonas Kuppler <Jonas.Kuppler@uni-duesseldord.de>, Arne Bathke <Arne.Bathke@sbg.ac.at>

### References

**Examples**

```r
# example function dynRB_Pn
# for reliable results use steps = 201
data(finch2)
r<-dynRB_Pn(finch2, steps = 101)
```

---

**dynRB_Vn**

*Relative Dynamic Range Box size per dimension and object*

---

**Description**

Function returns Dynamic Range Box size of each dimension \( n \). Number of dynamic range boxes (steps) can be adjusted. Default: steps = 201

**Usage**

```r
dynRB_Vn(A = A, steps = 201, correlogram = FALSE, row_col = c(2, 2))
```

**Arguments**

- **A** Data frame, where the first column is a character vector and the other columns are numeric vectors.
- **steps** Number of range boxes. Default: steps = 201
- **correlogram** If TRUE, the correlogram for each species is shown. If FALSE, no correlogram is shown. Default: correlogram = FALSE
- **row_col** Number of rows and columns of the figures (correlogram for each species). Default: row_col = c(2, 2)

**Value**

Data frame containing the summarized niche length for each object and dimension.

**Author(s)**

Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>,
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,
Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author),
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,
Arne Bathke <Arne.Bathke@sbg.ac.at>

**References**


dynRB_VPa

Examples

```r
# example function dynRB_Vn
# for reliable results use steps = 201
data(finch2)
r<-dynRB_Vn(finch2, steps = 101)
```

---

**dynRB_VPa**  
*Size and pairwise overlap*

**Description**

Function returns size and pairwise overlaps of niches or trait-spaces. Size or overlaps of dimensions can be aggregated by using either "product", "mean" or "geometric mean" as aggregation method. The results obtained by using the product are automatically printed. Number of dynamic range boxes (steps) can be adjusted. Default: steps = 201

**Usage**

```r
dynRB_VPa(A = A, steps = 201, correlogram = FALSE, row_col = c(2, 2), pca.corr = FALSE, var.thres = 0.9)
```

**Arguments**

- `A`  
  Data frame, where the first column is a character vector and the other columns are numeric vectors.
- `steps`  
  Number of range boxes. Default: steps = 201
- `correlogram`  
  If TRUE, the correlogram for each species is shown. If FALSE, no correlogram is shown. Default: correlogram = FALSE
- `row_col`  
  Number of rows and columns of the figures (correlogram for each species). Default: row_col = c(2, 2)
- `pca.corr`  
  If TRUE, a principal components analysis is performed.
- `var.thres`  
  Variance predicted by the PCA-axes, if pca.corr = TRUE.

**Value**

Data frame containing the summarized niche overlap (and volume) for each pair of objects aggregated by all three possible choices (i.e. product, mean, geometric mean).

**Author(s)**

Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>,  
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,  
Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author),  
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,  
Arne Bathke <Arne.Bathke@sbg.ac.at>
References

Examples
# example function dynRB_VPa
# for reliable results use steps = 201
data(finch2)
r<-dynRB_VPa(finch2, steps = 101, correlogram = TRUE, row_col = c(1,1))
r$result

finch

Data set finch

Description
To demonstrate the application of the functions for real world data, we used existing data sets on niches and trait-spaces and quantified their sizes and overlaps. The data set finch is a data set on morphological measurements of Darwin finches. The data set comprises quantitative measurements of nine traits characterizing five species of finches, each trait was measured at least in 10 individuals per species.

Usage
data("finch")

Format
A data frame with 146 observations on the following 10 variables.

Species  a character vector of the Species Geospiza helioletes, Geospiza prosthemelas prosthemelas, Geospiza fuliginosa parvula, Geospiza fortis fortis and Geospiza fortis platyrhyncha
BodyL  a numeric vector
WingL  a numeric vector
TailL  a numeric vector
BeakW  a numeric vector
BeakH  a numeric vector
LBeakL  a numeric vector
UBeakL  a numeric vector
N.UBkL  a numeric vector
TarsusL  a numeric vector
Source

Examples
data(finch)
## quick overview
head(finch)

finch2  
Subset of data set finch

Description
To demonstrate the application of the functions for real world data, we used existing data sets on niches and trait-spaces and quantified their sizes and overlaps. The data set finch2 is a data set on morphological measurements of three Darwin finches. The data set comprises quantitative measurements of nine traits characterizing two species of finches, each trait was measured at least in 10 individuals per species.

Usage
data("finch2")

Format
A data frame with 103 observations on the following 10 variables.
Species  a character vector of the Species Geospiza fuliginosa parvula and Geospiza fortis fortis
BodyL  a numeric vector
WingL  a numeric vector
TailL  a numeric vector
BeakW  a numeric vector
BeakH  a numeric vector
LBeakL  a numeric vector
UBeakL  a numeric vector
N.UBkL  a numeric vector
TarsusL  a numeric vector

Source
Overview function

Description

This function can be used to show the graphics generated by the functions dynRB_Pn, dynRB_Vn and dynRB_VPa.

Usage

overview(r, row_col = c(3, 3))

Arguments

- r: Output of the function dynRB_Pn, dynRB_Vn or dynRB_VPa.
- row_col: Number of rows and columns of the figures. Default: row_col = c(3, 3)

Author(s)

Manuela Schreyer <manuelalarissa.schreyer@sbg.ac.at>,
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,
Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author),
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,
Arne Bathke <Arne.Bathke@sbg.ac.at>

Examples

# example for the function dynRB_Pn
# for reliable results use steps = 201
data(finch2)
r <- dynRB_Pn(finch2, steps = 101)
overview(r)
Description

Function returns the asymmetric overlaps for each dimension, calculated by the method published by Parkinson et al. (2018) using ranks. Further two confidence intervals are returned for each estimate. The confidence level, as well as the repetitions for bootstrap can be adjusted.

Usage

\[
\text{ranks\_OV}(A = A, \alpha = 0.05, \text{reps4boot} = 1000, \text{digit} = 3)
\]

Arguments

- **A**: Data frame, where the first column contains two objects (e.g. species) and the other columns are numeric vectors (containing measurements).
- **alpha**: The confidence level. Default: \( \alpha = 0.05 \)
- **reps4boot**: Number of repetitions for the bootstrap. Default: \( \text{reps4boot} = 1000 \)
- **digit**: Number of digits after which the results are cut off. Default: \( \text{digit} = 3 \)

Value

Data Frame containing the two asymmetric overlaps for each dimension together with their confidence intervals. The last row contains the d-dimensional asymmetric overlaps.

Author(s)

Judith H. Parkinson <judith.parkinson@sbg.ac.at>,
Raoul Kutil <Raoul_Hugo.Kutil@stud.sbg.ac.at>,
Jonas Kuppler <Jonas.Kuppler@uni-duesseldorf.de>,
Robert R. Junker <Robert.Junker@sbg.ac.at> (corresponding author),
Wolfgang Trutschnig <Wolfgang.Trutschnig@sbg.ac.at>,
Arne Bathke <Arne.Bathke@sbg.ac.at>

References


Examples

```r
# example function ranks_OV
data(finch2)
head(finch2)
ranks_OV(finch2[1:4], alpha = 0.05)
```
Index

* datasets
  finch, 6
  finch2, 7

* package
  dynRB-package, 2

  dynRB (dynRB-package), 2
  dynRB-package, 2
  dynRB_Pn, 3
  dynRB_Vn, 4
  dynRB_VPa, 5

  finch, 6
  finch2, 7

overview, 8

ranks_OV, 9