Package 'rshift'

October 18, 2023

Type Package

Title Paleoecology Functions for Regime Shift Analysis

Version 3.0.0

Description Contains a variety of functions, based around
regime shift analysis of paleoecological data.
Citations:
Rodionov() from Rodionov (2004) <doi:10.1029/2004GL019448>
Lanzante() from Lanzante (1996) <doi:10.1002/(SICI)1097-0088(199611)16:11%3C1197::AID-JOC89%3E3.0.CO;2-L>
Hellinger_trans from Numerical Ecology, Legendre & Legendre (ISBN 9780444538680)
rolling_autoc from Liu, Gao & Wang (2018) <doi:10.1016/j.scitotenv.2018.06.276>
Sample data sets lake_data & lake_RSI processed from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>
Sample data set January_PDO from NOAA: <https://www.ncei.noaa.gov/access/monitoring/pdo/>.

Suggests R.rsp

VignetteBuilder R.rsp

Depends R (>= 3.5.0)

Imports grid, tibble, dplyr, ggplot2

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NeedsCompilation yes

SystemRequirements rustc & cargo if building from source

URL https://github.com/alexhroom/rshift

BugReports https://github.com/alexhroom/rshift/issues

Encoding UTF-8

LazyData true

RoxygenNote 7.2.3

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Repository CRAN

Date/Publication 2023-10-17 22:20:05 UTC

R topics documented:

`absolute_to_percentage`

Converts absolute abundance data to a percentage of total abundance for each site

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Description

Converts absolute abundance data to a percentage of total abundance for each site

Usage

```
absolute_to_percentage(data, col, site)
```

Arguments

`data`	The dataframe to be used.
`col`	The column that change is being measured on.
`site`	The column containing the site of each sample.

Value

The ‘data‘ dataframe with an added ’percentage’ column.

Hellinger_trans *Hellinger transform*

Description

Hellinger transforms data (Legendre and Legendre, Numerical Ecology)

Usage

```
Hellinger_trans(data, col, site)
```

Arguments

data	The dataframe to be used.
col	The column that change is being measured on.
site	The column containing the site of each sample.

Value

The ‘data‘ dataframe with an added ’hellinger_trans_vals’ column.

January_PDO *Pacific Decadal Oscillation in January*

Description

A dataset containing January PDO values. Subset of the data from NOAA: <https://www.ncei.noaa.gov/access/monitoring/pd

Usage

```
data(January_PDO)
```

Format

A data frame with 104 rows and 2 variables

Details

- PDO - Pacific Decadal Oscillation in January for the given year.
- Age - the year for which the PDO was measured.

lake_data *DCA-ordinated pollen data from Lake Consuelo*

Description

A dataset containing pre-processed DCA-ordinated data from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>

Usage

```
data(lake_data)
```

Format

A data frame with 39 rows and 2 variables

Details

- DCA1 - DCA values for each timepoint from the raw dataset.
- Age - timepoint of each sample that has been DCA-ordinated.

lake_RSI *DCA-ordinated pollen data from Lake Consuelo with RSI values*

Description

A dataset containing pre-processed DCA-ordinated data from Bush, Silman & Urrego (2004) <doi:10.1126/science.1090795>
This data has been processed using Rodionov(lake_data, "DCA1", "Age", l=5, merge=TRUE)

Usage

```
data(lake_RSI)
```

Format

A data frame with 39 rows and 3 variables

Details

- DCA1 - DCA values for each timepoint from the raw dataset.
- Age - timepoint of each sample that has been DCA-ordinated.
- RSI - Regime Shift Index (see docs for Rodionov()) for each timepoint.

Lanzante *Lanzante L-test*

Description

performs the L-method for detection of regime shifts (Lanzante, 1996)

Usage

```
Lanzante(data, col, time, p = 0.05, merge = FALSE)
```

Arguments

data	The dataframe to be used.
col	The column we are measuring change on.
time	The column containing time units (e.g. age of a subsample)
p	The largest p-value you want to check regime shifts for. Defaults to p = 0.05.
merge	Sets the result to be either a regime-shift only table (if FALSE), or an addition to the original table (if TRUE)

Value

If merge = FALSE (default), produces a 2-column table of time (the time value for each regime shift) and p (the p-value for each regime shift). If merge = TRUE, returns the original dataset with an extra p-value column, giving the p-value for each time unit - 0 for non-shift years.

Examples

```
Lanzante(lake_data, "DCA1", "Age")
Lanzante(lake_data, "DCA1", "Age", p=0.10, merge=TRUE)
```

Rodionov *Rodionov (2004)'s STARS algorithm*

Description

performs STARS analysis (Rodionov, 2004) on a dataset

Usage

```
Rodionov(data, col, time, l, prob = 0.05, startrow = 1, merge = FALSE)
```

Arguments

data	The dataframe to be used.
col	The column we are measuring change on.
time	The column containing time units (e.g. age of a subsample)
l	The cut-off length of a regime; affects sensitivity (see Rodionov, 2004)
prob	The p-value for significance of a regime shift. Defaults to p = 0.05.
startrow	What row the analysis starts at. Defaults to 1.
merge	Sets the result to be either a regime-shift only table (if FALSE), or an addition to the original table (if TRUE)

Value

If merge = FALSE (default), produces a 2-column table of time (the time value for each regime shift) and RSI (the regime shift index for each regime shift). If merge = TRUE, returns the original dataset with an extra RSI column, giving the regime shift index for each time unit - 0 for non-shift years.

Examples

```
Rodionov(lake_data, "DCA1", "Age", l=5)
Rodionov(lake_data, "DCA1", "Age", l=5, prob=0.01, startrow=2, merge=TRUE)
```

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rolling_autoc *Rolling autocorrelation*

Description

finds lag-1 autocorrelation in a rolling window; can be used to predict resilience (Liu, Gao, & Wang, 2018)

Usage

```
rolling_autoc(data, col, l)
```

Arguments

data	The dataframe that will be used.
col	The column we are measuring change on.
l	The time interval (no. of columns) used in the autocorrelation.

Value

A table of rolling lag-1 autocorrelation values.

RSI_graph *Regime Shift Index graph*

Description

creates two graphs, one of data and one of the RSI, as seen in Rodionov (2004)

Usage

```
RSI_graph(data, col, time, rsi)
```

Arguments

data	The dataframe that will be used.
col	The column we are measuring change on.
time	The column containing time units (e.g. age of a subsample)
rsi	The column containing RSI values (for best visualisation use Rodionov() with merge=TRUE)

Value

Two graphs, one on top of the other; one of col against time and one of RSI against time.

Examples

```
RSI_graph(lake_RSI, "DCA1", "Age", "RSI")
```

rust_rodionov *Calculate STARS RSI points and return to R as a vector*

Description

Calculate STARS RSI points and return to R as a vector

Usage

```
rust_rodionov(vals, t_crit, l)
```

Arguments

vals	The column we are measuring change on
t_crit	The critical value of a t-distribution at the desired p-value
l	The cut-off length of a regime; affects sensitivity

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