Package ‘rshift’

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Type Package

Title Paleoecology Functions for Regime Shift Analysis

Version 2.2.0

Description Contains a variety of functions, based around regime shift analysis of paleoecological data.

Citations:

Suggests R.rsp

VignetteBuilder R.rsp

Depends R (>= 3.5.0)

Imports grid, tibble, dplyr, ggplot2, magrittr

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NeedsCompilation yes

SystemRequirements rustc & cargo if building from source

Encoding UTF-8

LazyData true

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Author Alex H. Room [aut, cre, cph] (<https://orcid.org/0000-0002-5314-2331>), Felipe Franco-Gaviria [ctb, fnd] (<https://orcid.org/0000-0003-4799-1457>), Dunia H. Urrego [ctb, fnd] (<https://orcid.org/0000-0001-7938-5529>)

Maintainer Alex H. Room <alex.room@btinternet.com>

Repository CRAN

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```r
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`absolute_to_percentage`

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

**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  

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.

lake_data  

Description

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.
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.

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 (2004)'s STARS algorithm

Description
performs STARS analysis (Rodionov, 2004) on a dataset

Usage
Rodionov(data, col, time, l, prob = 0.95, 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=0.99, startrow=2, merge=TRUE)
**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.

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**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

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

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

**Description**

Calculate STARS RSI points and return to R as a vector

**Usage**

```r
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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