Package ‘sExtinct’

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Type Package
Title Calculates the historic date of extinction given a series of sighting events
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Description This package combines several sighting based estimators of historical extinction, allowing them to be run simultaneously or individually. Code for this package was contributed by Ben Collen, Gene Hunt and Tracy Rout. Additional code was taken from McPherson & Myers (2009).
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Description

sExtinct combines several sighting based estimators of historical extinction.

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This package brings together several sighting-based estimators of species loss. These estimators use historical sighting events to calculate the probability of a species persistence. The estimators can be run simultaneously (using run.all), or individually (see help files). Care should be taken if using low level functions (functions ending in .fun). New users should use intermediate level functions (Robson1964, Solow1993.eq2, OLE) which correct data before running the estimators.

This is a work in progress, and additional estimators are sought. Please contact author (see below).

Author(s)

Package written by Christopher Clements <c.clements@outlook.com>.

Code for functions was contributed by:

Ben Collen
Gene Hunt
Tracy Rout

Additional code take from the Appendix of McPherson & Myers (2009)

References


example.data


See Also

run.all Robson1964 Solow1993.eq2 OLE

Examples

data(example.data)
run.all(example.data, 0.05, 2012, FALSE, FALSE)

example.data  Example data

Description

A fictional data set of historic sighting events.

Usage

data(example.data)

Format

A data frame with 8 observations on the following 2 variables.

years  a numeric vector of the years sights have or have not occured at. Sorted from earliest at the top to latest at the bottom. Restricted to one row per year.

sightings  a numeric vector of the number of sighting events (if any) that have occured in that year.

Examples

data(example.data)
example.data
OLE

*Optimal linear estimation*

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**Description**

A function that calculates the predicted date of extinction using the optimal linear estimation technique proposed by Roberts and Solow (2003) and Solow (2005). Differs from other techniques in this package as it requires only data to produce a point estimate of the date of extinction (not dependent on 1-alpha CI), and uses alpha to calculate the upper and lower 1-alpha CI.

**Usage**

```r
OLE(sightingdata, alpha)
```

**Arguments**

- `sightingdata`: A data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. Column names are not restricted. Data must be ranked from oldest at the top, to most recent at the bottom, and restricted to a single row per year. See example.data.

- `alpha`: A 1-alpha confidence interval is calculated for a given value of alpha, typically set as 0.05 (i.e. a 95% CI). OLE produces an upper and lower confidence interval estimate, the lower obviously bound by the last sighting event. See Clements et al. for a discussion on the use of 95% CI’s produced by OLE.

**Author(s)**

Christopher Clements

**References**


**Examples**

```r
data(example.data)
OLE.fun(example.data, alpha=0.05)
```
**print.extmod**

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### Description

Defines how extinction predictor results are displayed.

### Usage

```r
## S3 method for class 'extmod'
print(x, ...)
## S3 method for class 'simpextmod'
print(x, ...)
```

### Arguments

- `x`: results from the estimator
- `...`: ...

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**Robson1964**

### Description

Sighting based estimators of extinction that will calculate p values for persistence at each year after the last sighting event of a species. Unlike Burgman, Solow1993.eq2, Solow2005.eq7 these predictors do not need a test.year.

### Usage

```r
Robson1964(sightingdata, alpha, data.out)
Strauss89(sightingdata, alpha, data.out)
```

### Arguments

- `sightingdata`: A data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. Column names are not restricted. Data must be ranked from oldest at the top, to most recent at the bottom, and restricted to a single row per year. See example.data.
- `alpha`: A 1-alpha confidence interval is calculated for a given value of alpha, typically set as 0.05 (i.e. a 95%CI).
- `data.out`: A year which chance of persistence is calculated up until, typically set as the current year (i.e. test whether the species is currently predicted to be extant or extinct).
**Author(s)**

Christopher Clements

**References**


**Examples**

```r
data(example.data)
Robson1964(example.data, alpha=0.05, data.out=FALSE)
```

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**run.all**

**Run all extinction estimators**

**Description**

A function that runs all the sighting based extinction predictors within this package. The function can produce diagnostic plots (utilising the package lattice) and produce simple, and detailed data outputs.

**Usage**

```r
run.all(sightingdata, alpha, test.year, data.out, plot)
```

**Arguments**

- **sightingdata** A data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. Column names are not restricted. Data must be ranked from oldest at the top, to most recent at the bottom, and restricted to a single row per year. See `example.data`

- **alpha** A 1-alpha confidence interval is calculated for a given value of alpha, typically set as 0.05 (i.e. a 95%CI).

- **test.year** A year which chance of persistence is calculated up until, typically set as the current year (i.e. test whether the species is currently predicted to be extant or extinct).

- **data.out** A TRUE/FALSE argument where TRUE produces the predicted chance of persistence at each time step (where applicable), and FALSE gives a simple output with the predicted date of extinction only.

- **plot** A TRUE/FALSE argument where TRUE produces a diagnostic plot showing the probability of persistence estimated by each method, where applicable, along with the alpha level set.
Value

If data.out=TRUE, a data.frame of probability of persistence at each time step, for each method, except OLE which produces a point estimate of extinction only.

If data.out=FALSE, a data.frame of the predicted date of extinction only, produced by each method. NOTE: upper and lower CIs are only calculated OLE, and will be filled in with NAs for the other estimators.

Author(s)

Christopher Clements

References


Examples

data(example.data)
run.all(example.data, alpha=0.05, test.year=2012, data.out=FALSE, plot=FALSE)

Description

A collection of functions requiring, in addition to the normal intermediate level inputs of data, alpha and data.out, a test.year value. The test.year (typically set as the current year) is the date that p values of persistence are calculated up to.

Usage

Burgman(sightingdata, alpha, test.year, data.out)
Solow1993.eq2(sightingdata, alpha, test.year, data.out)
Solow2005.eq7(sightingdata, alpha, test.year, data.out)
Arguments

sightingdata  A data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. Can be gaps in the data (which are filled in by the function as 0 sightings within that year). Column names are not restricted. Data must be ranked from oldest at the top, to most recent at the bottom, and restricted to a single row per year. See example.data.

alpha  A 1-alpha confidence interval is calculated for a given value of alpha, typically set as 0.05 (i.e. a 95%CI).

test.year  A year which chance of persistence is calculated up until, typically set as the current year (i.e. test whether the species is currently predicted to be extant or extinct).

data.out  A TRUE/FALSE argument where TRUE produces the predicted chance of persistence at each time step (where applicable), and FALSE gives a simple output with the predicted date of extinction only.

Note

This is a work in progress, to submit a new (to this package) sighting based method for inferring prediction please contact the author (details can be found on www.chrisclementsresearch.co.uk)

Author(s)

Christopher Clements

References


See Also

Solow1993.eq2.fun

Examples

data(example.data)
Burgman(example.data, alpha=0.05, test.year=2012, data.out=FALSE)
Low level functions for Burgman, Solow1993.eq2, Solow2005.eq7

Description

Low level functions on which intermediate level functions are based. Included here for advanced users only. Functions take only a data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. There must not be missing values in the data frames (i.e. years where sightings=0 must also be included). Functions will calculate the p-value of persistence for the final year in the data frame. To calculate the p-value for the present day the data.frame must contain all the years since the last sighting event with 0 sightings (this is automatically added by the intermediate level functions).

Usage

burgman.fun(dd)
solow1993.eq2.fun(dd)
solow2005.eq7.fun(dd)

Arguments

dd A data.frame with two columns, the first containing the year at which a sighting has (or as not) occurred, the second a column of the number of sightings that have occurred in each year. Gaps in sighting history must be filled, see description above. Column names are not restricted. Data must be ranked from oldest at the top, to most recent at the bottom, and restricted to a single row per year.

Author(s)

Christopher Clements

References


Examples

years <- c(1950:2012)
sightings <- c(1,0,3,4,0,1,0,1,c(rep(0, 55)))
example.data.for.simple.functions<-data.frame(years, sightings)

Solow2005.eq7.fun(example.data.for.simple.functions)
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