Package 'pollen'

October 7, 2018

Type Package

Title Analysis of Aerobiological Data

Version 0.71.0

Description Supports analysis of aerobiological data.
Available features include determination of pollen season limits,
replacement of outliers (Kasprzyk and Walanus (2014) <doi:10.1007/s10453-014-9332-8>),
and calculation of growing degree days.

Imports lubridate, purrr, dplyr

Suggests covr, testthat, knitr, rmarkdown

URL https://github.com/Nowosad/pollen

BugReports https://github.com/Nowosad/pollen/issues

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LazyData TRUE

VignetteBuilder knitr

RoxygenNote 6.1.0

NeedsCompilation no

Author Jakub Nowosad [aut, cre] (<https://orcid.org/0000-0002-1057-3721>)

Maintainer Jakub Nowosad <nowosad.jakub@gmail.com>

Repository CRAN

Date/Publication 2018-10-07 07:50:03 UTC

R topics documented:

gdd *Growing Degree Days Function*

Description

This function calculates growing degree days (GDD) using the average of the daily maximum and minimum temperatures, a base temperature and a maximum base temperature

Usage

```
gdd(tmax, tmin, tbase, tbase_max)
```

Arguments

tmax	daily maximum temperature
tmin	daily minimum temperature
tbase	base temperature
tbase_max	maximum base temperature

Value

a numeric vector with GDD values

Examples

```
set.seed(25)
df <- data.frame(tmax=runif(100, 6, 10), tmin=runif(100, 4,6))

gdd(tmax = df$tmax, tmin = df$tmin, tbase = 5, tbase_max = 30)
```

outliers_replacer *A Outliers Replacer Function*

Description

This function finds outliers in pollen time-series and replaces them with background values

Usage

```
outliers_replacer(value, date, threshold = 5, sum_percent = 100)
```

Arguments

value	pollen concentration values
date	dates
threshold	a number indicating how many times outlying value needs to be larger than the background to be replaced (default is 5)
sum_percent	a sum_percent parameter

Value

a new data.frame object with replaced outliers

References

Kasprzyk, I. and A. Walanus.: 2014. Gamma, Gaussian and Logistic Distribution Models for Airborne Pollen Grains and Fungal Spore Season Dynamics, Aerobiologia 30(4), 369-83.

Examples

```
data(pollen_count)
df <- subset(pollen_count, site=='Shire')
new_df <- outliers_replacer(df$birch, df$date)
identical(df, new_df)

library('purrr')
new_pollen_count <- pollen_count %>% split(., .$site) %>%
       map_df(~outliers_replacer(value=.$hazel, date=.$date, threshold=4))
```

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pollen_count *Pollen count of alder, birch, and hazel*

Description

pollen_count A dataset containing a synthetic data of alder, birch, and hazel pollen count in four locations ('Oz', 'Shire', 'Atlantis', 'Hundred Acre Wood') between 2007 and 2016

Format

A data frame with 8352 rows and 5 variables:

- site
- date
- alder
- birch
- hazel

`pollen_season` *A Pollen Season Function*

Description

This function calculates the start and the end of pollen season for each year

Usage

```
pollen_season(value, date, method, threshold = NULL)
```

Arguments

`value`	pollen concentration values
`date`	dates
`method`	the pollen season method - "90", "95", "98", "Mesa", "Jager", "Lejoly", or "Driessen"
`threshold`	a threshold value used for the "Driessen" method

Value

a data.frame object with year, date of pollen season start and date of pollen season end

References

Nilsson S. and Persson S.: 1981, Tree pollen spectra in the Stockholm region (Sweden) 1973-1980, Grana 20, 179-182.

Andersen T.B.: 1991, A model to predict the beginning of the pollen season, Grana 30, 269-275.

Torben B.A.: 1991, A model to predict the beginning of the pollen season, Grana 30, 269-275.

Galan C., Emberlin J., Dominguez E., Bryant R.H. and Villamandos F.: 1995, A comparative analysis of daily variations in the Gramineae pollen counts at Cordoba, Spain and London, UK, Grana 34, 189-198.

Sanchez-Mesa J.A., Smith M., Emberlin J., Allitt U., Caulton E. and Galan C.: 2003, Characteristics of grass pollen seasons in areas of southern Spain and the United Kingdom, Aerobiologia 19, 243-250.

Jager S., Nilsson S., Berggren B., Pessi A.M., Helander M. and Ramfjord H.: 1996, Trends of some airborne tree pollen in the Nordic countries and Austria, 1980-1993. A comparison between Stockholm, Trondheim, Turku and Vienna, Grana 35, 171-178.

Lejoly-Gabriel and Leuschner: 1983, Comparison of air-borne pollen at Louvain-la-Neuve (Belgium) and Basel (Switzerland) during 1979 and 1980, Grana 22, 59-64.

Driessen M. N. B. M., Van Herpen R. M. A. and Smithuis, L. O. M. J.: 1990, Prediction of the start of the grass pollen season for the southern part of the Netherlands, Grana, 29(1), 79-86.

Examples

```
data(pollen_count)
df <- subset(pollen_count, site=='Oz')
pollen_season(value=df$birch, date=df$date, method="95")

df2 <- subset(pollen_count, site=='Atlantis')
pollen_season(value=df2$alder, date=df2$date, method="95")

library('purrr')
pollen_count %>% split(., .$site) %>%
             map_df(~pollen_season(value=.$hazel, date=.$date, method="95"), .id="site")
```

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