Package ‘epitweetr’

November 15, 2023

Title  Early Detection of Public Health Threats from 'Twitter' Data

Version  2.2.16

Description  It allows you to automatically monitor trends of tweets by time, place and topic aiming at detecting public health threats early through the detection of signals (e.g. an unusual increase in the number of tweets). It was designed to focus on infectious diseases, and it can be extended to all hazards or other fields of study by modifying the topics and keywords. More information is available in the ‘epitweetr’ peer-review publication (doi:10.2807/1560-7917.ES.2022.27.39.2200177).

License  EUPL

URL  https://github.com/EU-ECDC/epitweetr

BugReports  https://github.com/EU-ECDC/epitweetr/issues

Encoding  UTF-8

Imports  bit64, dplyr, curl, DT, emayili, future, httpuv, htr, htmltools, jsonlite, keyring, knitr, lifecycle, ggplot2, janitor, magrittr, parallel, plotly, processx, rtweet, readxl, rlang, stats, stringr, tidyverse, tidytext, tools, utils, xtable, xml2

RoxygenNote  7.2.0

Suggests  taskscheduleR

VignetteBuilder  knitr

NeedsCompilation  no

Author  Laura Espinosa [aut, fnd, cre]
         (<https://orcid.org/0000-0003-0748-9657>, Project manager, author of the design and concept of the package, and package maintainer),
Francisco Orchard [aut, ctr] (<https://orcid.org/0000-0001-5793-3301>,
Author of the package and original code),
Ariana Wijermans [ctb] (Contributor to the design and concept of the package),
Thomas Mollet [ctb, fnd] (Business owner of the project, and contributor to the design and concept of the package),
Adrian Prodan [ctb],
Thomas Czernichow [ctb],
Maria Prieto Gonzalez [ctb],
Esther Kissling [ctb],
Michael Höhle [ctb]

Maintainer Laura Espinosa <laura.espinosa@ecdc.europa.eu>
Repository CRAN
Date/Publication 2023-11-15 09:30:08 UTC

R topics documented:

check_all .................................................. 3
create_map ............................................... 3
create_snapshot ......................................... 5
create_topchart .......................................... 6
create_topwords .......................................... 8
detect_loop ............................................... 9
download_dependencies ................................. 11
ears_t_reweighted ...................................... 12
epitweetr_app ............................................ 13
fs_loop ...................................................... 14
generate_alerts .......................................... 15
geolocate_text .......................................... 16
get_aggregates .......................................... 18
get_alerts ................................................. 19
get_tasks .................................................. 21
get_todays_sample_tweets ............................... 22
health_check .............................................. 23
is_detect_running ....................................... 24
is_fs_running ............................................ 24
is_search_running ....................................... 25
json2lucene .............................................. 25
register_detect_runner_task ......................... 26
register_fs_monitor ..................................... 27
register_fs_runner_task ............................... 28
register_search_runner_task ......................... 28
save_config ............................................... 29
search_loop .............................................. 30
search_tweets ............................................. 31
setup_config .............................................. 33
set_twitter_app_auth ................................... 34
stop_detect_runner_task ............................... 36
stop_fs_runner_task ..................................... 36
stop_search_runner_task ............................... 37
trend_line ............................................... 38
update_geonames ........................................ 39
update_languages ....................................... 41
check_all

Description

It runs a set of automated sanity checks for helping the user to troubleshoot issues.

Usage

check_all()

Details

This function executes a series of sanity checks, concerning Java, bitness, task status, dependencies and Twitter authentication.

Value

Data frame containing the statuses of all realized checks.

Examples

```r
if(FALSE){
    #importing epitweer
    library(epitweetr)
    message('Please choose the epitweetr data directory')
    setup_config(file.choose())
    #running all tests
    check_all()
}
```

create_map

Plot the map report on the epitweetr dashboard

Description

Generates a bubble map plot of number of tweets by countries, for one topic.
create_map

Usage

create_map(
  topic = c(),
  countries = c(1),
  date_min = "1900-01-01",
  date_max = "2100-01-01",
  with_retweets = FALSE,
  location_type = "tweet",
  caption = "",
  proj = NULL,
  forplotly = FALSE
)

Arguments

topic Character(1) containing the topic to use for the report

countries Character vector containing the name of the countries and regions to plot or their respective indexes on the Shiny app, default: c(1)

date_min Date indicating start of the reporting period, default: "1900-01-01"

date_max Date indicating end of the reporting period, default: "2100-01-01"

with_retweets Logical value indicating whether to include retweets in the time series, default: FALSE

location_type Character(1) vector indicating the location type. Possible values 'tweet', 'user' or 'both', default: 'tweet'

caption Character(1) vector indicating a caption to print at the bottom of the chart, default: ""

proj Parameter indicating the CRS (Coordinate Reference System) to use on PROJ4 format CRS-class? If null and all countries are selected +proj=robin is used (Robinson projection) otherwise the Lambert azimuthal equal-area projection will be chosen, default: NULL

forplotly Logical(1) parameter indicating whether some hacks are activated to improve plotly rendering, default: FALSE

Details

Produces a bubble chart map for a particular topic on number of tweets collected based on the provided parameters. The map will display information at country level if more than one country is selected, otherwise it will display bubbles at the smallest possible location identified for each tweet within the period which could be any administrative level or city level.

Tweets associated with a country but with no finer granularity are omitted when displaying a single country.

When an aggregated zone is requested, all countries in that zone are included.

This functions requires that search_loop and detect_loop have already been run successfully to show results.
create_snapshot

Value

A named list containing two elements: ‘chart’ with the ggplot2 figure and ‘data’ containing the
dataframe that was used to build the map.

See Also

trend_line create_topwords detect_loop search_loop spTransform,coordinates,is.projected,CRS-class
fortify.geom_polygon,geom_point

Examples

if(FALSE){
  #Getting bubble chart for dengue for South America for last 30 days
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  create_map(
    topic = "dengue",
    countries = "South America",
    date_min = as.Date(Sys.time())-30,
    date_max=as.Date(Sys.time())
  )
}

create_snapshot

Snapshot of your epitweetr installation

Description

Creates a snapshot file of your epitweetr installation folder. This can include all or a subset of the
data files.

Usage

create_snapshot(
  destination_dir,
  types = c("settings", "dependencies", "machine-learning", "aggregations", "tweets",
            "logs"),
  tweets_period = get_aggregated_period(),
  aggregated_period = get_aggregated_period(),
  compress = TRUE,
  progress = function(v, m) message(paste(round(v * 100, 2), m))
)

Arguments

destination_dir,

character(1) vector with the path of the destination folder to produce the snapshot
create_topchart

Plot the top elements for a specific series on the epitweetr dashboard

Description

Generates a bar plot of most popular elements in tweets, for one topic. Top elements among ("top-words", "hashtags", "entities", "contexts", "urls")
create_topchart

Usage

create_topchart(
  topic,
  serie,
  country_codes = c(),
  date_min = "1900-01-01",
  date_max = "2100-01-01",
  with_retweets = FALSE,
  location_type = "tweet",
  top = 25
)

Arguments

topic Character(1) containing the topic to use for the report
serie Character(1) name of the series to be used for the report. It should be one of
  ("topwords", "hashtags", "entities", "contexts", "urls")
country_codes Character vector containing the ISO 3166-1 alpha-2 countries to plot, default: c()
date_min Date indicating start of the reporting period, default: "1900-01-01"
date_max Date indicating end of the reporting period, default: "2100-01-01"
with_retweets Logical value indicating whether to include retweets in the time series, default: FALSE
location_type Character(1) this parameter is currently being IGNORED since this report shows
  only tweet location and cannot show user or both locations for performance
  reasons, default: 'tweet'
top numeric(1) Parameter indicating the number of words to show, default: 25

Details

Produces a bar chart showing the occurrences of the most popular words in the collected tweets
based on the provided parameters. For performance reasons on tweet aggregation, this report only
shows tweet location and ignores the location_type parameter.

This functions requires that search_loop and detect_loop have already been run successfully to
show results.

Value

A named list containing two elements: 'chart' with the ggplot2 figure and 'data' containing the data
frame that was used to build the map.

See Also

trend_line create_map detect_loop search_loop
Examples

```r
if(FALSE){
  message("Please choose the epitweetr data directory")
  setup_config(file.choose())
  # Getting topword chart for dengue for France, Chile, Australia for last 30 days
  create_topchart(
    topic = "dengue",
    serie = "topwords",
    country_codes = c("FR", "CL", "AU"),
    date_min = as.Date(Sys.time())-30,
    date_max = as.Date(Sys.time())
  )
}
```

create_topwords  
Plot the top words report on the epitweetr dashboard

Description

Generates a bar plot of most popular words in tweets, for one topic

Usage

```r
create_topwords(
  topic, 
  country_codes = c(),
  date_min = "1900-01-01",
  date_max = "2100-01-01",
  with_retweets = FALSE,
  location_type = "tweet",
  top = 25
)
```

Arguments

- `topic`: Character(1) containing the topic to use for the report
- `country_codes`: Character vector containing the ISO 3166-1 alpha-2 countries to plot, default: c()
- `date_min`: Date indicating start of the reporting period, default: "1900-01-01"
- `date_max`: Date indicating end of the reporting period, default: "2100-01-01"
- `with_retweets`: Logical value indicating whether to include retweets in the time series, default: FALSE
- `location_type`: Character(1) this parameter is currently being IGNORED since this report shows only tweet location and cannot show user or both locations for performance reasons, default: 'tweet'
- `top`: numeric(1) Parameter indicating the number of words to show, default: 25
**Details**

Produces a bar chart showing the occurrences of the most popular words in the collected tweets based on the provided parameters. For performance reasons on tweet aggregation this report only shows tweet location and ignores the location_type parameter.

This report may be empty for combinations of countries and topics with very few tweets since for performance reasons, the calculation of top words is an approximation using chunks of 10.000 tweets.

This function requires that `search_loop` and `detect_loop` have already been run successfully to show results.

**Value**

A named list containing two elements: 'chart' with the ggplot2 figure and 'data' containing the data frame that was used to build the map.

**See Also**

trend_line create_map detect_loop search_loop

**Examples**

```r
if(FALSE){
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  # Getting topword chart for dengue for France, Chile, Australia for last 30 days
  create_topwords(
    topic = "dengue",
    country_codes = c("FR", "CL", "AU"),
    date_min = as.Date(Sys.time())-30,
    date_max = as.Date(Sys.time())
  )
}
```

**detect_loop**

*Runs the detect loop*

**Description**

Infinite loop ensuring the daily signal detection and email alerts

**Usage**

detect_loop(data_dir = NA)
Arguments

data_dir  Path to the 'data directory' containing application settings, models and collected
tweets. If not provided the system will try to reuse the existing one from last
session call of setup_config or use the EPI_HOME environment variable, de-
default: NA

Details

The detect loop is composed of three 'one shot tasks' download_dependencies, update_geonames,
update_languages ensuring the system has all necessary components and data to run the three re-
current tasks generate_alerts

The loop report progress on the 'tasks.json' file which is read or created by this function.

The recurrent tasks are scheduled to be executed each 'detect span' minutes, which is a parameter
set on the Shiny app.

If any of these tasks fails it will be retried three times before going to abort status. Aborted tasks
can be relaunched from the Shiny app.

Value

nothing

See Also

download_dependencies
update_geonames
update_languages
detect_loop
generate_alerts
get_tasks

Examples

if(FALSE){
  #Running the detect loop
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  detect_loop()
}
**download_dependencies**  
**Updates Java dependencies**

**Description**
Download Java dependencies of the application mainly related to Apache SPARK and Lucene.

**Usage**
download_dependencies(tasks = get_tasks())

**Arguments**
tasks Task object for reporting progress and error messages, default: get_tasks()

**Details**
Run a one-shot task consisting of downloading Java and Scala dependencies, this is separated by the following subtasks

- Download jar dependencies from configuration maven repo to project data folder. This includes scala, spark, lucene. Packages to be downloaded are defined in package file 'sbt-deps.txt'

- Download winutils from configuration URL to project data folder. For more details on winutils please see https://issues.apache.org/jira/browse/HADOOP-13223 and https://issues.apache.org/jira/browse/HADOOP-16816

The URLs to download the JAR dependencies (maven package manager) and Winutils are on the configuration tab of the Shiny app.

Normally this function is not called directly by the user but from the `detect_loop` function.

**Value**
The list of tasks updated with produced messages

**See Also**
detect_loop  
get_tasks

**Examples**
```r
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message("Please choose the epitweetr data directory")
  setup_config(file.choose())
```
ears_t_reweighted

algorithm for outbreak detection, extends the EARS algorithm

Description

The simple 7 day running mean version of the Early Aberration Reporting System (EARS) algorithm is extended as follows:

- proper computation of the prediction interval
- downweighting of previous signals, similar to the approach by Farrington (1996)

Usage

```r
ears_t_reweighted(
  ts,
  alpha = 0.025,
  alpha_outlier = 0.05,
  k_decay = 4,
  no_historic = 7L,
  same_weekday_baseline = FALSE
)
```

Arguments

- **ts** A numeric vector containing the counts of the univariate time series to monitor. The last time point in ts is investigated
- **alpha** The alpha is used to compute the upper limit of the prediction interval: (1-alpha) * 100%, default: 0.025
- **alpha_outlier** Residuals beyond 1-alpha_outlier quantile of the the t(n-k-1) distribution are downweighted, default: 0.05
- **k_decay** Power k in the expression (r_star/r_threshold)^k determining the weight, default: 4
- **no_historic** Number of previous values i.e -1, -2, ..., no_historic to include when computing baseline parameters, default: 7
- **same_weekday_baseline** whether to calculate baseline using same weekdays or any day, default: FALSE

Details

for algorithm details see package vignette.
**Value**

A dataframe containing the monitored time point, the upper limit and whether a signal is detected or not.

**Author(s)**

Michael Hoehle <https://www.math.su.se/~hoehle>

**Examples**

```r
if(FALSE){
    library(epitweetr)
    # Running the modifies version of the ears algorithm for a particular data series
    ts <- c(150, 130, 122, 160, 155, 128, 144, 125, 300, 319, 289, 277, 500)
    show(ears_t_reweighted(ts))
    show(ears_t_reweighted(ts))
}
```

**Description**

Open the epitweetr Shiny app, used to setup the Data collection & processing pipeline, the Requirements & alerts pipeline and to visualise the outputs.

**Usage**

```r
epitweetr_app(data_dir = NA)
```

**Arguments**

- `data_dir` Path to the 'data directory' containing application settings, models and collected tweets. If not provided the system will try to reuse the existing one from last session call of `setup_config` or use the EPI_HOME environment variable, default: NA

**Details**

The epitweetr app is the user entry point to the epitweetr package. This application will help the user to setup the tweet collection process, manage all settings, see the interactive dashboard visualisations, export them to Markdown or PDF, and setup the alert emails.

All its functionality is described on the epitweetr vignette.

**Value**

The Shiny server object containing the launched application
See Also

search_loop
detect_loop

Examples

```r
if(FALSE){
  #Running the epitweetr app
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  epitweetr_app()
}
```

---

### fs_loop

**Runs the epitweetr embedded database loop**

**Description**

Infinite loop ensuring that the epitweetr embedded database is running (Lucene + akka-http)

**Usage**

```r
fs_loop(data_dir = NA)
```

**Arguments**

- `data_dir`: Path to the 'data directory' containing application settings, models and collected tweets. If not provided, the system will try to reuse the existing one from last session call of `setup_config` or use the EPI_HOME environment variable, default: NA

**Details**

Launches the epitweetr embedded database which is accessed via a REST API located on `http://localhost:8080`. You can test that the database is running by accessing `http://localhost:8080/ping` the REST API provide epitweetr a way to send and retrieve data related with tweets and time series and to trigger geolocation or aggregation. The database is implemented using Apache Lucene indexes allowing epitweetr to access its data as a search engine but also as a tabular database. `health_check` called each 60 seconds on a background process to send alerts to the administrator if some epitweetr components fail.

**Value**

nothing
generate_alerts

See Also
detect_loop
search_loop
health_check

Examples

```r
if(FALSE){
  #Running the detect loop
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  fs_loop()
}
```

---

**generate_alerts**  
**Execute the alert task**

**Description**

Evaluate alerts for the last collected day for all topics and regions and send email alerts to subscribers.

**Usage**

```r
generate_alerts(tasks = get_tasks())
```

**Arguments**

tasks  
Current tasks for reporting purposes, default: get_tasks()

**Details**

This function calculates alerts for the last aggregated day and then send emails to subscribers. The alert calculation is based on the country_counts time series which stores alerts by country, hour and topics.

For each country and region, the process starts by aggregating the last N days. A day is a block of consecutive 24 hours ending before the hour of the collected last tweet. N is defined by the alert baseline parameter on the configuration tab of the Shiny application (the default is N=7).

An alert will be produced when the number of tweets observed is above the threshold calculated by the modified version of the EARS algorithm (for more details see the package vignette). The behaviour of the alert detection algorithm is modified by the signal false positive rate (alpha), down-weighting of previous alerts and weekly or daily baseline parameters as defined on the configuration tab of the Shiny application and the topics file.

A prerequisite to this function is that the `search_loop` must already have stored collected tweets in the search folder and that the geotagging and aggregation tasks have already been run. Normally this function is not called directly by the user but from the `detect_loop` function.
The list of tasks updated with produced messages

See Also
detect_loop

Examples

```r
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())

  # calculating alerts for last day tweets and sending emails to subscribers
  generate_alerts()
}
```

---

**geolocate_text**  
*geolocate text in a data frame given a text column and optionally a language column*

Description

extracts geolocation information on text on a column of the provided data frame and returns a new data frame with geolocation information

Usage

`geolocate_text(df, text_col = "text", lang_col = NULL, min_score = NULL)`

Arguments

- `df`  
  A data frame containing at least character column with text, a column with the language name can be provided to improve geolocation quality
- `text_col`  
  character, name of the column on the data frame containing the text to geolocalize, default: text
- `lang_col`  
  character, name of the column on the data frame containing the language of texts, default: NULL
- `min_score`, numeric, the minimum score obtained on the Lucene scoring function to accept matches on GeoNames. It has to be empirically set default: NULL
Details

This function perform a call to the epitweetr database which includes functionality for geolocating for languages activated and successfully processed on the shiny app.

The geolocation process tries to find the best match in GeoNames database [https://www.geonames.org/](https://www.geonames.org/) including all local aliases for words.

If no language is associated to the text, all tokens will be sent as a query to the indexed GeoNames database.

If a language code is associated to the text and this language is trained on epitweetr, entity recognition techniques will be used to identify the best candidate in text to contain a location and only these tokens will be sent to the GeoNames query.

A custom scoring function is implemented to grant more weight to cities increasing with population to try to perform disambiguation.

Rules for forcing the geolocation choices of the algorithms and for tuning performance with manual annotations can be performed on the geotag tab of the Shiny app.

A prerequisite to this function is that the tasks `download_dependencies` `update_geonames` and `update_languages` has been run successfully.

This function is called from the Shiny app on geolocation evaluation tab but can also be used for manually evaluating the epitweetr geolocation algorithm.

Value

A new data frame containing the following geolocation columns: `geo_code`, `geo_country_code`, `geo_country`, `geo_name`, `tags`

See Also

- `download_dependencies`
- `update_geonames`
- `detect_loop`

Examples

```r
if(FALSE) {
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory'
  setup_config(file.choose())

  # creating a test dataframe
  df <- data.frame(text = c("Me gusta Santiago de Chile es una linda ciudad"), lang = c("es"))
  geo <- geolocate_text(df = df, text_col = "text", lang_col="lang")
}
```
get_aggregates  

**Description**

Read and returns the required aggregated dataset for the selected period and topics defined by the filter.

**Usage**

```r
get_aggregates(
  dataset = "country_counts",
  cache = TRUE,
  filter = list(),
  top_field = NULL,
  top_freq = NULL
)
```

**Arguments**

- **dataset**: A character(1) vector with the name of the series to request, it must be one of 'country_counts', 'geolocated', 'topwords', 'hashtags', 'entities', 'urls', 'contexts', default: 'country_counts'
- **cache**: Whether to use the cache for lookup and storing the returned dataframe, default: TRUE
- **filter**: A named list defining the filter to apply on the requested series, it should be on the shape of a named list e.g. `list(tweet_geo_country_code=list('FR', 'DE'))` default: list()
- **top_field**: Name of the top field used with top_frequency to enable optimisation for getting only most frequent elements. It will only keep top 500 items after first 50k lines on reverse index order
- **top_freq**: character, Name of the frequency fields used with top_field to enable optimisation for getting only most frequent elements. It will only keep top 500 items after first 50k rows on reverse index order

**Details**

This function returns data aggregated by epitweetr. The data is found on the 'series' folder, which contains Rds files per weekday and type of series. starting on v 1.0.x it will also look on Lucene indexes situated on fs folder. Names of files and folders are parsed to limit the files to be read. When using Lucene indexes, filters are directly applied on read. This is an improvement compared 'series' folder where filters are applied after read. All returned rows are joined in a single dataframe. If no filter is provided all data series is returned, which can end up with millions of rows depending on the time series. To limit by period, the filter list must have an element 'period' containing a date vector or list with two dates representing the start and end of the request.
To limit by topic, the filter list must have an element 'topic' containing a non-empty character vector or list with the names of the topics to return.

The available time series are:

- "country_counts" counting tweets and retweets by posted date, hour and country
- "geolocated" counting tweets and retweets by posted date and the smallest possible geolocated unit (city, administrative level or country)
- "topwords" counting tweets and retweets by posted date, country and the most popular words, (this excludes words used in the topic search)

The returned dataset can be cached for further calls if requested. Only one dataset per series is cached.

Value

A data frame containing the requested series for the requested period

See Also

detect_loop fs_loop

Examples

```r
if(FALSE){
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  # Getting all country tweets between 2020-jan-10 and 2020-jan-31 for all topics
  df <- get_aggregates(    
    dataset = "country_counts",
    filter = list(period = c("2020-01-10", "2020-01-31"))
  )

  # Getting all country tweets for the topic dengue
  df <- get_aggregates(dataset = "country_counts", filter = list(topic = "dengue"))

  # Getting all country tweets between 2020-jan-10 and 2020-jan-31 for the topic dengue
  df <- get_aggregates(    
    dataset = "country_counts",
    filter = list(topic = "dengue", period = c("2020-01-10", "2020-01-31"))
  )
}
```

get_alerts

Getting signals produced by the task generate_alerts of detect_loop

Description

Returns a data frame of signals produced by the detect_loop, which are stored on the signal folder.
Usage

get_alerts(
  topic = character(),
  countries = numeric(),
  from = "1900-01-01",
  until = "2100-01-01",
  toptweets = 0,
  limit = 0,
  duplicates = "all",
  progress = function(a, b) { }
)

Arguments

topic Character vector. When it is not empty it will limit the returned signals to the
provided topics, default: character()
countries Character vector containing the names of countries or regions or a numeric vec-
tor containing the indexes of countries as displayed at the Shiny App to filter the
signals to return., default: numeric()
from Date defining the beginning of the period of signals to return, default: '1900-01-
01'
until Date defining the end of the period of signals to return, default: '2100-01-01'
toptweets Integer number of top tweets to be added to the alert. These are obtained from
the tweet index based on topwords and Lucene score, default: 0
limit Maximum number of alerts returned, default: 0
duplicates Character, action to decide what to do with alerts generated on the same day.
Options are "all" (keep all alerts), "first" get only first alert and "last" for getting
only the last alert
progress Function, function to report progress it should receive two parameter a progress
between 0 and 1 and a message, default: empty function

Details

For more details see the package vignette.

Value

a data frame containing the calculated alerts for the period. If no alerts are found then NULL is
returned

See Also

generate_alerts
detect_loop
get_tasks

Examples
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())

  # Getting signals produced for last 30 days for a particular country
  get_alerts(
    countries = c("Chile", "Australia", "France"),
    from = as.Date(Sys.time())-30,
    until = as.Date(Sys.time())
  )
}

get_tasks

Get the detect_loop task status

Description
Reads the status of the detect_loop tasks and updates it with changes requested by the Shiny app

Usage
get_tasks(statuses = list())

Arguments
 statuses Character vector for limiting the status of the returned tasks, default: list()

Details
After reading the tasks.json file and parsing it with jsonlite, this function will update the necessary fields in the tasks for executing and monitoring them.

Value
A named list containing all necessary information to run and monitor the detect loop tasks.

See Also
download_dependencies
update_geonames
update_languages
detect_loop
generate_alerts
get_todays_sample_tweets

Get a sample of latest tweet geolocations (deprecated)

Description

This function was removed from epitweetr v1.0.1. Please use search_tweets instead.

Usage

get_todays_sample_tweets(limit = 1000, text_col = "text", lang_col = "lang")

Arguments

- **limit**: Size of the sample, default: 100
- **text_col**: Name of the tweet field to geolocate it should be one of the following ("text", "linked_text", "user_description", "user_location", "place_full_name", "linked_place_full_name"), default: "text"
- **lang_col**: Name of the tweet variable containing the language to evaluate. It should be one of the following ("lang", "linked_lang", NA), default: "lang"

Details

This function was removed from epitweetr v1.0.1. Please use search_tweets instead.

Value

Data frame containing the sampled tweets and the geolocation metrics

See Also

download_dependencies
update_geonames
update_languages
**Examples**

```r
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message("Please choose the epitweetr data directory")
  setup_config(file.choose())

  # geolocating today's tweets
  show(get_todays_sample_tweets())
}
```

---

**health_check**

*Send email to administrator if a failure of epitweetr is detected*

**Description**

It validates if epitweetr is not collecting tweets, aggregating tweets or not calculating alerts

**Usage**

```r
health_check(send_mail = TRUE, one_per_day = TRUE)
```

**Arguments**

- `send_mail`  Boolean. Whether an email should be sent to the defined administrator, default: TRUE
- `one_per_day`  Boolean. Whether a limit of one email per day will be applied, default: TRUE

**Details**

This function sends an email to the defined administrator if epitweetr is not collecting tweets, aggregating tweets or not calculating alerts

**Value**

A list of health check errors found

**Examples**

```r
if(FALSE){
  #importing epitweetr
  library(epitweetr)
  message("Please choose the epitweetr data directory")
  setup_config(file.choose())

  #sending the email to the administrator if epitweetr components are not properly working
  health_check()
}
```
is_detect_running  Check whether the alert detection task is running

Description
gets the alert detection runner execution status

Usage
is_detect_running()

Details
returns a logical value being TRUE if the alert detection task is actually running

Value
logical Whether the alert detection task is running

Examples
if(FALSE){
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  is_detect_running()
}

is_fs_running  Check whether the database is running

Description
gets the database runner execution status

Usage
is_fs_running()

Details
returns a logical value being TRUE if the database runner is actually running

Value
logical Whether the database is running
is_search_running

Examples

```r
if(FALSE){
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  is_fs_running()
}
```

is_search_running  Check whether the tweet collection task is running

Description

gets the tweet collection execution status

Usage

```r
is_search_running()
```

Details

returns a logical value being TRUE if the tweet collection is running

Value

logical  Whether the tweet collection is running

Examples

```r
if(FALSE){
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  is_search_running()
}
```

json2lucene  Function used for migrating tweets from to old to the new file system

Description

migrates geolocated tweets from the old to the new file system allowing full text search using Apache Lucene Indexes

Usage

```r
json2lucene(tasks = get_tasks(), chunk_size = 400)
```
Arguments

- **tasks**: named list, current tasks for logging and updating progress default: `get_tasks()`
- **chunk_size**: integer, the chunk size for indexing tweets, default: 400

Details

This function can be called manually to perform the migration of tweets between v0.0.x to v2+. It iterates over existing tweets collected with epitweetr v0.0.x series joins base tweets and geolocated tweets and then sends them to the Lucene index via the dedicated REST API. Migrated files will be moved to `search_archive` and `geo_archive` folders. Users can backup and remove these folders when migration ends to gain disk space. Series folders are maintained for migrated tweets.

Value

the updated tasks.

Examples

```r
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  # running the migration
  json2lucene()
}
```

---

**register_detect_runner_task**

*Registers the alert detection task*

Description

registers the alert detection task or stops if no configuration has been set or if it is already running.

Usage

```r
register_detect_runner_task()
```

Details

Registers the alert detection task or stops if no configuration has been set or if it is already running. To generate alerts, this task needs the tweet collection to have successfully run since the last time it ran. This function will use the task scheduler on Windows and will fall back to launching the runner as a separate process (attached to this session) on Linux.
register_fs_monitor

Value

Nothing

Examples

if(FALSE){
  # getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  register_detect_runner_task()
}

register_fs_monitor  Registers the fs_monitor for the current process or exits

Description

registers the fs_monitor (by writing fs.monitor.PID file) for the current process or stops if no configuration has been set or if it is already running.

Usage

register_fs_monitor()

Details

Registers the fs_monitor (by writing fs.monitor.PID file) for the current process or stops if no configuration has been set or if it is already running. This function has been exported so it can be properly called from the future package on the database runner, but it is not intended to be directly called by end users.

Value

Nothing

Examples

if(FALSE){
  # getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  register_fs_monitor()
}
register_fs_runner_task

Registers the epitweetr database task

Description

registers the epitweetr database task or stops if no configuration has been set or if it is already running

Usage

register_fs_runner_task()

Details

Registers the epitweetr database task or stops if no configuration has been set or if it is already running. This task need the dependencies, geonames and languages steps to have been successfully ran. This can be done on the shiny app configuration page or by manually running the detect_runner_task. This function will try to use the task scheduler on windows and will fall back to launching the runner as a separate process (attached to this session) on Linux.

Value

Nothing

Examples

if(FALSE){
  #getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  register_fs_runner_task()
}

register_search_runner_task

Registers the tweet collection task

Description

registers the tweet collection task or stops if no configuration has been set or if it is already running

Usage

register_search_runner_task()
**Details**

Registers the tweet collection task or stops if no configuration has been set or if it is already running. Twitter authentication needs to be previously set on the shiny app or by calling `set_twitter_app_auth()`. You can test if authentication is working on the shiny app troubleshooting page or by calling (with dplyr):

`epitweetr::check_all()` This function will use the task scheduler on windows and will fall back to launching the runner as a separate process (attached to this session) on Linux.

**Value**

Nothing

**Examples**

```r
if(FALSE){
  #getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  register_search_runner_task()
}
```

---

**Description**

Permanently saves configuration changes to the data folder (excluding Twitter credentials, but not SMTP credentials)

**Usage**

```r
save_config(data_dir = conf$data_dir, properties = TRUE, topics = TRUE)
```

**Arguments**

- `data_dir` Path to a directory to save configuration settings, Default: `conf$data_dir`
- `properties` Whether to save the general properties to the properties.json file, default: TRUE
- `topics` Whether to save topic download plans to the topics.json file, default: TRUE

**Details**

Permanently saves configuration changes to the data folder (excluding Twitter credentials, but not SMTP credentials) to save Twitter credentials please use `set_twitter_app_auth`

**Value**

Nothing
search_loop

Runs the search loop

Description

Infinite loop ensuring the permanent collection of tweets

Usage

search_loop(data_dir = NA)

Arguments

data_dir optional path to the 'data directory' containing application settings, models and collected tweets. If not provided it will reuse the last set on the current session. If not provided the system will try to reuse the existing one from last session call of setup_config or use the EPI_HOME environment variable. Default: NA

Details

The detect loop is a pure R function designed for downloading tweets from the Twitter search API. It can handle several topics ensuring that all of them will be downloaded fairly using a round-robin philosophy and respecting Twitter API rate-limits.

The progress of this task is reported on the 'topics.json' file which is read or created by this function. This function will try to collect tweets respecting a 'collect_span' window in minutes, which is defined on the Shiny app and defaults to 60 minutes.

To see more details about the collection algorithm please see epitweetr vignette.

In order to work, this task needs Twitter credentials, which can be set on the Shiny app or using set_twitter_app_auth

See Also

setup_config set_twitter_app_auth

Examples

if(FALSE){
  library(epitweetr)
  #load configuration
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  #make some changes
  #conf$collect_span = 90
  #saving changes
  save_config()
}

search_loop
Value

Nothing

See Also

set_twitter_app_auth

Examples

if(FALSE){
  #Running the search loop
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  search_loop(file.choose())
}

search_tweets
perform full text search on tweets collected with epitweetr

Description

perform full text search on tweets collected with epitweetr (tweets migrated from epitweetr v<1.0.x are also included)

Usage

search_tweets(
  query = NULL,
  topic = NULL,
  from = NULL,
  to = NULL,
  countries = NULL,
  mentioning = NULL,
  users = NULL,
  hide_users = FALSE,
  action = NULL,
  max = 100,
  by_relevance = FALSE
)

Arguments

query character. The query to be used if a text it will match the tweet text. To see how to match particular fields please see details, default:NULL

topic character, Vector of topics to include on the search default:NULL

from an object which can be converted to "POSIXlt" only tweets posted after or on this date will be included, default:NULL
to an object which can be converted to ""POSIXlt"" only tweets posted before or on this date will be included, default:NULL

countries character or numeric, the position or name of epitweetr regions to be included on the query, default:NULL

mentioning character, limit the search to the tweets mentioning the given users, default:NULL

users character, limit the search to the tweets created by the provided users, default:NULL

hide_users logical, whether to hide user names on output replacing them by the USER keyword, default:FALSE

action character, an action to be performed on the search results respecting the max parameter. Possible values are 'delete' or 'anonymise', default:NULL

max integer, maximum number of tweets to be included on the search, default:100

by_relevance logical, whether to sort the results by relevance of the matching query or by indexing order, default:FALSE If not provided the system will try to reuse the existing one from last session call of setup_config or use the EPI_HOME environment variable, default: NA

Details

epitweetr translate the query provided by all parameters into a single query that will be executed on tweet indexes which are weekly indexes. The q parameter should respect the syntax of the Lucene classic parser https://lucene.apache.org/core/8_5_0/queryparser/org/apache/lucene/queryparser/classic/QueryParser.html So other than the provided parameters, multi field queries are supported by using the syntax field_name:value1;value2 AND, OR and -(for excluding terms) are supported on q parameter. Order by week is always applied before relevance so even if you provide by_relevance = TRUE all of the matching tweets of the first week will be returned first

Value

da data frame containing the tweets matching the selected filters, the data frame contains the following columns: linked_user_location, linked_user_name, linked_user_description, screen_name, created_date, is_geo_located, user_location_loc, is_retweet, text, text_loc, user_id, hash, user_description, linked_lang, linked_screen_name, user_location, totalCount, created_at, topic_tweet_id, topic, lang, user_name, linked_text, tweet_id, linked_text_loc, hashtags, user_description_loc

See Also

search_loop
detect_loop

Examples

if(FALSE){
  #Running the detect loop
  library(epitweetr)
  message("Please choose the epitweetr data directory")
  setup_config(file.choose())
  df <- search_tweets(
setup_config

q = "vaccination",
topic="COVID-19",
countries=c("Chile", "Australia", "France"),
from = Sys.Date(),
to = Sys.Date()
}
df$text
}

setup_config  
Load epitweetr application settings

Description
Load epitweetr application settings from the designated data directory

Usage

setup_config(
  data_dir = if (exists("data_dir", where = conf)) conf$data_dir else if
  (Sys.getenv("EPI_HOME") != "") Sys.getenv("EPI_HOME") else file.path(getwd(),
  "epitweetr"),
  ignore_keyring = FALSE,
  ignore_properties = FALSE,
  ignore_topics = FALSE,
  save_first = list()
)

Arguments

data_dir  Path to the directory containing the application settings (it must exist). If not
  provided it takes the value of the latest call to setup_config in the current ses-
  sion, or the value of the EPI_HOME environment variable or epitweetr sub-
  directory in the working directory, default: if (exists("data_dir", where = conf))
  conf$data_dir else if (Sys.getenv("EPI_HOME") != "") Sys.getenv("EPI_HOME")
  else file.path(getwd(), "epitweetr")
ignore_keyring  Whether to skip loading settings from the keyring (Twitter and SMTP creden-
  tials), default: FALSE
ignore_properties  Whether to skip loading settings managed by the Shiny app in properties.json
  file, Default: FALSE
ignore_topics  Whether to skip loading settings defined in the topics.xlsx file and download
  plans from topics.json file, default: FALSE
save_first  Whether to save current settings before loading new ones from disk, default:
  list()
set_twitter_app_auth

Details

epitweetr relies on settings and data stored in a system folder, so before loading the dashboard, collecting tweets or detecting alerts the user has to designate this folder. When a user wants to use epitweetr from the R console they will need to call this function for initialisation. The 'data_folder' can also be given as a parameter for program launch functions epitweetr_app, search_loop or detect_loop, which will internally call this function.

This call will fill (or refresh) a package scoped environment 'conf' that will store the settings. Settings stored in conf are:

- General properties of the Shiny app (stored in properties.json)
- Download plans from the Twitter collection process (stored in topics.json merged with data from the topics.xlsx file)
- Credentials for Twitter API and SMTP stored in the defined keyring

When calling this function and the keyring is locked, a password will be prompted to unlock the keyring. This behaviour can be changed by setting the environment variable 'ecdc_twitter_tool_kr_password' with the password.

Changes made to conf can be stored permanently (except for 'data_dir') using:

- save_config, or
- set_twitter_app_auth

Value

Nothing

See Also

save_config set_twitter_app_auth epitweetr_app search_loop detect_loop

Examples

```r
if(FALSE){
  library(epitweetr)
  #loading system settings
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
}
```

---

set_twitter_app_auth  Save Twitter App credentials

Description

Update Twitter authentication tokens in a configuration object
set_twitter_app_auth

Usage

set_twitter_app_auth(
  app = "", 
  access_token = "", 
  access_token_secret = "", 
  api_key = "", 
  api_secret = "", 
  bearer = ""
)

Arguments

app Application name
access_token Access token as provided by Twitter
access_token_secret Access token secret as provided by Twitter
api_key API key as provided by Twitter
api_secret API secret as provided by Twitter
bearer the bearer token of the application

Details

Update Twitter authentication tokens in configuration object

Value

Nothing

See Also

save_config

Examples

if(FALSE){
  #Setting the configuration values
  set_twitter_app_auth(
    app = "my super app",
    access_token = "123456",
    access_token_secret = "123456",
    api_key = "123456",
    api_secret = "123456"
  )
  set_twitter_app_auth(
    bearer = "123456"
  )
}
stop_detect_runner_task

*Stops the alert detection task*

**Description**

stops the alert detection task

**Usage**

```r
stop_detect_runner_task()
```

**Details**

Stops the alert detection task if it is already running. This function will try also deactivate the respective scheduled task on Windows.

**Value**

Nothing

**Examples**

```r
if(FALSE){
  #getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  stop_detect_runner_task()
}
```

---

stop_fs_runner_task  *Stops the epitweetr database task*

**Description**

stops the epitweetr database task

**Usage**

```r
stop_fs_runner_task()
```

**Details**

Stops the epitweetr database task if it is already running. This function will try also deactivate the respective scheduled task on Windows.
**stop_search_runner_task**

**Value**

Nothing

**Examples**

```r
if(FALSE){
  # getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  stop_fs_runner_task()
}
```

---

**stop_search_runner_task**

*Stops the tweet collection task*

---

**Description**

stops the tweet collection task

**Usage**

```r
stop_search_runner_task()
```

**Details**

Stops the tweet collection task if it is already running. This function will try also deactivate the respective scheduled task on Windows.

**Value**

Nothing

**Examples**

```r
if(FALSE){
  # getting tasks statuses
  library(epitweetr)
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  stop_search_runner_task()
}
```
trend_line

Plot the trendline report of epitweetr dashboard

Description
Generates a trendline chart of number of tweets by region, for one topic, including alerts using the reweighted version of the EARS algorithm

Usage
trend_line(
topic,
countries = c(1),
date_type = "created_date",
date_min = "1900-01-01",
date_max = "2100-01-01",
with_retweets = FALSE,
location_type = "tweet",
alpha = 0.025,
alpha_outlier = 0.05,
k_decay = 4,
no_historic = 7,
bonferroni_correction = FALSE,
same_weekday_baseline = FALSE
)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>topic</td>
<td>Character(1) containing the topic to use for the report</td>
</tr>
<tr>
<td>countries</td>
<td>Character vector containing the name of the countries and regions to plot or their respective indexes on the Shiny app select, default: c(1)</td>
</tr>
<tr>
<td>date_type</td>
<td>Character vector specifying the time granularity of the report either 'created_weeknum' or 'created_date', default: 'created_date'</td>
</tr>
<tr>
<td>date_min</td>
<td>Date indicating start of the reporting period, default: &quot;1900-01-01&quot;</td>
</tr>
<tr>
<td>date_max</td>
<td>Date indicating end of the reporting period, default: &quot;2100-01-01&quot;</td>
</tr>
<tr>
<td>with_retweets</td>
<td>Logical value indicating whether to include retweets in the time series, default: FALSE</td>
</tr>
<tr>
<td>location_type</td>
<td>Character(1) vector indicating the location type. Possible values 'tweet', 'user' or 'both', default: 'tweet'</td>
</tr>
<tr>
<td>alpha</td>
<td>Numeric(1) value indicating the alert detection confidence, default: 0.025</td>
</tr>
<tr>
<td>alpha_outlier</td>
<td>Numeric(1) value indicating the outliers detection confidence for downweighting, default: 0.05</td>
</tr>
<tr>
<td>k_decay</td>
<td>Strength of outliers downweighting, default: 4</td>
</tr>
<tr>
<td>no_historic</td>
<td>Number of observations to build the baseline for signal detection, default: 7</td>
</tr>
</tbody>
</table>
bonferroni_correction
   Logical value indicating whether to apply the Bonferroni correction for signal
detection, default: FALSE

same_weekday_baseline
   Logical value indicating whether to use same day of weeks for building the
baseline or consecutive days, default: FALSE

Details
Provides a multi-region line chart for a particular topic of number of tweets collected based on the
provided parameters. Alerts will be calculated using a modified version of the EARS algorithm that
applies a Farrington inspired downweighting of previous outliers.

Days in this function are considered as contiguous blocks of 24 hours starting for the previous hour
of the last collected tweet.

This function requires search_loop and detect_loop to have already run successfully to show
results.

Value
A named list containing two elements: 'chart' with the ggplot2 figure and 'data' containing the data
frame that was used to build the chart.

See Also
create_map create_topwords generate_alerts detect_loop search_loop

Examples
if(FALSE){
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())
  #Getting trendline for dengue for South America for the last 30 days
  trend_line(
    topic = "dengue",
    countries = "South America",
    date_min = as.Date(Sys.time())-30,
    date_max=as.Date(Sys.time())
  )
}

update_geonames
   Updates the local copy of the GeoNames database

Description
Downloading and indexing a fresh version of the GeoNames database from the provided URL.
update_geonames

Usage

update_geonames(tasks = get_tasks())

Arguments

tasks Tasks object for reporting progress and error messages, default: get_tasks()

Details

Run a one shot task to download and index a local copy of the GeoNames database. The GeoNames geographical database covers all countries and contains over eleven million place names that are available; Creative Commons Attribution 4.0 License.

The URL to download the database from is set on the configuration tab of the Shiny app, in case it changes.

The indexing is developed in Spark and Lucene

A prerequisite to this function is that the search_loop must already have stored collected tweets in the search folder and that the task download_dependencies has been successfully run.

Normally this function is not called directly by the user but from the detect_loop function.

Value

The list of tasks updated with produced messages

See Also

download_dependencies
detect_loop
get_tasks

Examples

if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())

  # geolocating last tweets
  tasks <- update_geonames()
}
update_languages

Description

Downloading and indexing a fresh version of language models tagged for update on the Shiny app configuration tab

Usage

update_languages(tasks = get_tasks())

Arguments

tasks Tasks object for reporting progress and error messages, default: get_tasks()

Details

Run a one shot task to download and index a local fasttext pretrained models. A fasttext model is a collection of vectors for a language automatically produced scrolling a big corpus of text that can be used to capture the semantic of a word.

The URL to download the vectors from are set on the configuration tab of the Shiny app.

This task will also update SVM models to predict whether a word is a location that will be used in the geolocation process.

The indexing is developed in SPARK and Lucene.

A prerequisite to this function is that the search_loop must already have stored collected tweets in the search folder and that the tasks download_dependencies and update_geonames has been run successfully.

Normally this function is not called directly by the user but from the detect_loop function.

Value

The list of tasks updated with produced messages

See Also

download_dependencies
update_geonames
detect_loop
get_tasks
Examples

```r
if(FALSE){
  library(epitweetr)
  # setting up the data folder
  message('Please choose the epitweetr data directory')
  setup_config(file.choose())

  # updating language tasks
  tasks <- update_languages()
}
```
Index

check_all, 3
coordinates, 5
create_map, 3, 7, 9, 39
create_snapshot, 5
create_topchart, 6
create_topwords, 5, 8, 39
detect_loop, 4, 5, 7, 9, 10, 11, 14–21, 32, 34, 39–41
download_dependencies, 10, 11, 17, 21, 22, 40, 41
ears_t_reweighted, 12
epitweetr_app, 13, 34

fortify, 5
fs_loop, 14, 19
generate_alerts, 10, 15, 19–21, 39
geolocate_text, 16
geom_point, 5
geom_polygon, 5
get_aggregates, 18
get_alerts, 19
get_tasks, 10, 11, 21, 40, 41
get_todays_sample_tweets, 22

health_check, 14, 15, 23
is.projected, 5
is_detect_running, 24
is_fs_running, 24
is_search_running, 25
json2lucene, 25

register_detect_runner_task, 26
register_fs_monitor, 27
register_fs_runner_task, 28
register_search_runner_task, 28
save_config, 29, 34, 35

search_loop, 4, 5, 7, 9, 14, 15, 30, 32, 34, 39–41

search_tweets, 31
set_twitter_app_auth, 29–31, 34, 34
setup_config, 10, 13, 14, 30, 32, 33
spTransform, 5
stop_detect_runner_task, 36
stop_fs_runner_task, 36
stop_search_runner_task, 37
trend_line, 5, 7, 9, 38

update_geonames, 10, 17, 21, 22, 39, 41
update_languages, 10, 17, 21, 22, 41