Package ‘geeLite’

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Type Package

Title Building and Managing Local Databases from Google Earth Engine

Version 1.0.1

Description Simplifies the creation, management, and updating of local databases using data extracted from Google Earth Engine (GEE). It integrates with GEE to store, aggregate, and process spatio-temporal data, leveraging 'SQLite' for efficient, serverless storage. The package provides utilities for data transformation and supports real-time monitoring and analysis of geospatial features, making it suitable for researchers and practitioners in geospatial science.

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Encoding UTF-8

LazyData true

RoxygenNote 7.3.2

VignetteBuilder knitr

Imports rnaturalearth,
googledrive,
data.table,
reticulate,
rstudioapi,
lubridate,
jsonlite,
magrittr,
progress,
reshape2,
tidyrgee,
RSQLite,
stringr,
crayon,
dplyr,
h3jsr,
knitr,
utils,
purrr,
stats,
tidyr,
rgee,
cli,
sf

Suggests testthat (>= 3.0.0),
rnaturalearthdata,
geojsonio,
rmarkdown,
leaflet,
withr

Config/testthat/edition 3

R topics documented:

`fetch_regions` *Fetch ISO 3166-2 Region Codes*

Description

Returns a data frame containing ISO 3166-2 region codes for the specified administrative level.

Usage

```
fetch_regions(admin_lvl = 0)
```

Arguments

`admin_lvl`	[optional] (integer) Specifies the administrative level to retrieve. Use `0` for country-level, `1` for state-level, or `NULL` to include all regions (default: `0`).

Value

A data frame containing region names, ISO 3166-2 codes, and the corresponding administrative levels.

Examples

```
# Example: Fetch ISO 3166-2 region codes
## Not run:
  fetch_regions()

## End(Not run)
```

`fetch_vars` *Fetch Variable Information from an SQLite Database*

Description

Displays information on the available variables in the SQLite database (`data/geelite.db`).

Usage

```
fetch_vars(
  path,
  format = c("data.frame", "markdown", "latex", "html", "pipe", "simple", "rst")
)
```

Arguments

`path`	[mandatory] (character) Path to the root directory of the generated database.
`format`	[mandatory] (character) A character string. Possible values are `"data.frame"` (default) to return a `data.frame` object, or one of `"markdown"`, `"latex"`, `"html"`, `"pipe"` (Pandoc's pipe tables), `"simple"` (Pandoc's simple tables), and `"rst"` to be passed on to knitr for formatting.

Value

Returns the variable information in the selected format. If `format = "data.frame"`, a `data.frame` is returned. For other formats, the output is printed in the specified format and `NULL` is

Examples

```
# Example: Printing the available variables
## Not run:
  fetch_vars(path = "path/to/db")

## End(Not run)
```

`gee_install` *Install and Configure a Conda Environment for 'rgee'*

Description

Sets up a Conda environment with all required Python and R dependencies for using the `rgee` package, including a specific version of the `earthengine-api`. If Conda is not available, Miniconda will be installed. The created environment is automatically registered for use with `rgee`.

Usage

```
gee_install(conda = "rgee", python_version = "3.10", force_recreate = FALSE)
```

Arguments

conda	[optional] (character) Name of the Conda environment to create or use. Defaults to "rgee".
python_version	[optional] (character) Python version to use when creating the Conda environment. Defaults to "3.10".
force_recreate	[optional] (logical) If TRUE, deletes and recreates the Conda environment even if it already exists. Defaults to FALSE.

Value

Invisibly returns the name of the Conda environment used or created.

Examples

```
# Example: Creating a Conda environment with 'rgee' dependencies
## Not run:
  gee_install()

## End(Not run)
```

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get_config *Print the Configuration File*

Description

Reads and prints the configuration file from the database's root directory in a human-readable format.

Usage

```
get_config(path)
```

Arguments

path	[mandatory] (character) The path to the root directory of the generated database.

Value

A character string representing the formatted JSON content of the configuration file.

Examples

```
# Example: Printing the configuration file
## Not run:
  get_config(path = "path/to/db")

## End(Not run)
```

get_state *Print the State File*

Description

Reads and prints the state file from the database's root directory in a human-readable format.

Usage

```
get_state(path)
```

Arguments

path	[mandatory] (character) The path to the root directory of the generated database.

Value

A character string representing the formatted JSON content of the state file.

Examples

```
# Example: Printing the state file
## Not run:
  get_state(path = "path/to/db")

## End(Not run)
```

init_postp *Initialize Post-Processing Folder and Files*

Description

Creates a `postp` folder at the specified path and adds two empty files: `structure.json` and `functions.R`.

Usage

```
init_postp(path, verbose = TRUE)
```

Arguments

path	[mandatory] `character` The path to the root directory where the `postp` folder should be created.
verbose	[optional] (logical) Display messages (default: `TRUE`).

Details

The `structure.json` file is initialized with a default JSON structure: `"default": null`. This file is intended for mapping variables to post-processing functions. The `functions.R` file is created with a placeholder comment indicating where to define the R functions for post-processing. If the `postp` folder already exists, an error will be thrown to prevent overwriting existing files.

Examples

```
## Not run:
# Initialize post-processing folder and files in the database root directory
init_postp("/path/to/database")

## End(Not run)
```

`modify_config` *Modify Configuration File*

Description

Modifies the configuration file located in the specified root directory of the generated database (`config/config.json`) by updating values corresponding to the specified keys.

Usage

```
modify_config(path, keys, new_values, verbose = TRUE)
```

Arguments

`path`	[mandatory] (character) The path to the root directory of the generated database.
`keys`	[mandatory] (list) A list specifying the path to the values in the configuration file that need updating. Each path should correspond to a specific element in the configuration.
`new_values`	[mandatory] (list) A list of new values to replace the original values at the locations specified by 'keys'. The length of `new_values` must match the length of `keys`.
`verbose`	[optional] (logical) If `TRUE`, displays messages about the updates made (default: `TRUE`).

Examples

```
# Example: Modifying the configuration file
## Not run:
  modify_config(
    path = "path/to/db",
    keys = list("limit", c("source", "MODIS/061/MOD13A2", "NDVI")),
    new_values = list(1000, "mean")
  )

## End(Not run)
```

`read_db` *Reading, Aggregating, and Processing the SQLite Database*

Description

Reads, aggregates, and processes the SQLite database (`data/geelite.db`).

Usage

```
read_db(
  path,
  variables = "all",
 freq = c("month", "day", "week", "bimonth", "quarter", "season", "halfyear", "year"),
  prep_fun = NULL,
  aggr_funs = function(x) mean(x, na.rm = TRUE),
  postp_funs = NULL
)
```

Arguments

`path`	[mandatory] (character) Path to the root directory of the generated database.
`variables`	[optional] (character or integer) Names or IDs of the variables to be read. Use the `fetch_vars` function to identify available variables and IDs (default: `"all"`).
`freq`	[optional] (character) The frequency for data aggregation. Options include `"day"`, `"week"`, `"month"`, `"bimonth"`, `"quarter"`, `"season"`, `"halfyear"`, `"year"` (default: `"month"`).
`prep_fun`	[optional] (function or `NULL`) A function for pre-processing time series data prior to aggregation. If `NULL`, a default linear interpolation (via `linear_interp`) will be used for daily-frequency data. If non-daily, the default behavior simply returns the vector without interpolation.
`aggr_funs`	[optional] (function or list) A function or a list of functions for aggregating data to the specified frequency (`freq`). Users can directly refer to variable names or IDs. The default function is the mean: `function(x) mean(x, na.rm = TRUE)`.
`postp_funs`	[optional] (function or list) A function or list of functions applied to the time series data of a single bin after aggregation. Users can directly refer to variable names or IDs. The default is `NULL`, indicating no post-processing.

Value

A list where the first element (`grid`) is a simple feature (sf) object, and subsequent elements are data frame objects corresponding to the variables.

Examples

```
# Example: Reading variables by IDs
## Not run:
db_list <- read_db(path = "path/to/db",
  variables = c(1, 3))

## End(Not run)
```

run_geelite — *Build and Update the Grid Statistics Database*

Description

Collects and stores grid statistics from Google Earth Engine (GEE) data in SQLite format (`data/geelite.db`), initializes CLI files (`cli/...`), and initializes or updates the state (`state/state.json`) and log (`log/log.txt`) files.

Usage

```
run_geelite(
  path,
  conda = "rgee",
  user = NULL,
  rebuild = FALSE,
  mode = "local",
  verbose = TRUE
)
```

Arguments

`path`	[mandatory] (character) Path to the root directory of the generated database.
`conda`	[optional] (character) Name of the virtual Conda environment used by the `rgee` package (default: `"rgee"`).
`user`	[optional] (character) Specifies the Google account directory within `~/.config/earthengine/`. This directory stores credentials for a specific Google account (default: `NULL`).
`rebuild`	[optional] (logical) If `TRUE`, the database and its supplementary files are overwritten based on the configuration file (default: `FALSE`).
`mode`	[optional] (character) Mode of data extraction. Currently supports `"local"` or `"drive"` (for larger exports via Google Drive). Defaults to `"local"`.
`verbose`	[optional] (logical) Display computation status and messages (default: `TRUE`).

Value

Invisibly returns NULL, called for side effects.

Examples

```
# Example: Build a Grid Statistics Database
## Not run:
  run_geelite(path = "path/to/db")

## End(Not run)
```

`set_cli` *Initialize CLI Files*

Description

Creates R scripts to enable the main functions to be called through the Command Line Interface (CLI). These scripts are stored in the `cli/` directory of the generated database.

Usage

```
set_cli(path, verbose = TRUE)
```

Arguments

`path`	[mandatory] (character) The path to the root directory of the generated database.
`verbose`	[optional] (logical) Whether to display messages (default: `TRUE`).

Examples

```
# Example: Setting up CLI files
## Not run:
  set_cli(path = "path/to/db")

## End(Not run)
```

`set_config` *Initialize the Configuration File*

Description

Creates a configuration file in the specified directory of the generated database (`config/config.json`). If the specified directory does not exist but its parent directory does, it will be created.

Usage

```
set_config(
  path,
  regions,
  source,
  start = "2020-01-01",
  resol,
  scale = NULL,
  limit = 10000,
  verbose = TRUE
)
```

Arguments

`path`	[mandatory] (character) The path to the root directory of the generated database.
`regions`	[mandatory] (character) ISO 3166-2 codes of the regions of interest (two letters for countries and additional characters for states).
`source`	[mandatory] (list) Description of Google Earth Engine (GEE) datasets of interest (the complete data catalog of GEE is accessible at: `https://developers.google.com/earth-engine/datasets/catalog`). It is a nested list with three levels: **names** (list) Datasets of interest (e.g., `"MODIS/061/MOD13A1"`). **bands** (list) Bands of interest (e.g., `"NDVI"`). **zonal_stats** (character) Statistics of interest (options: `"mean"`, `"median"`, `"min"`, `"max"`, `"sd"`).
`start`	[optional] (date) First date of the data collection (default: `"2020-01-01"`).
`resol`	[mandatory] (integer) Resolution of the H3 bin.
`scale`	[optional] (integer) Specifies the nominal resolution (in meters) for image processing. If left as `NULL` (the default), a resolution of 1000 is used.
`limit`	[optional] (integer) In `"local"` mode, ‘limit / dates‘ sets batch size; in `"drive"` mode, ‘limit‘ is the max features per export (default: `10000`).
`verbose`	[optional] (logical) Display messages (default: `TRUE`).

Examples

```
# Example: Setting up the configuration file
## Not run:
  set_config(path = "path/to/db",
             regions = c("SO", "YM"),
             source = list(
              "MODIS/061/MOD13A1" = list(
                "NDVI" = c("mean", "sd")
             )
            ),
            resol = 3)

## End(Not run)
```

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