Package 'tidyrgee'

May 8, 2026

Title 'tidyverse' Methods for 'Earth Engine'

Version 0.1.1

Description Provides 'tidyverse' methods for wrangling and analyzing 'Earth Engine' <https://earthengine.google.com/> data. These methods help the user with filtering, joining and summarising 'Earth Engine' image collections.

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URL https://github.com/r-tidy-remote-sensing/tidyrgee

BugReports https://github.com/r-tidy-remote-sensing/tidyrgee/issues/

Depends R (>= 4.1)

Imports assertthat, crayon, dplyr, glue, lubridate, purrr, readr, rgee, rlang, sf, stringr, tidyr

Suggests knitr, reticulate, rmarkdown, tibble, testthat (>= 3.0.0)

Config/testthat/edition 3

Encoding UTF-8

LazyData true

RoxygenNote 7.3.1

NeedsCompilation no

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Repository CRAN

Date/Publication 2025-11-17 16:50:02 UTC

Contents

`add_date_to_bandname` *add_date_to_band_name*

Description

append date to band name

Usage

```
add_date_to_bandname(x)
```

Arguments

x	ee$ImageCollection or ee$Image

Value

a date to band name in x.

as_ee *as_ee tidyee to ee$ImageCollection or ee$Image*

Description

as_ee tidyee to ee$ImageCollection or ee$Image

Usage

```
as_ee(x)
```

Arguments

x	tidyee

Value

ee$ImageCollection or ee$Image

Examples

```
## Not run:
library(rgee)
library(tidyrgee)

modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")

# create tidyee class
modis_ic_tidy <- as_tidyee(modis_ic)
# convert back to origina ee$ImageCollection class
modis_ic_tidy |>
  as_ee()

## End(Not run)
```

as_tidyee *as_tidy_ee*

Description

The function returns a list containing the original object (Image/ImageCollection)as well as a "virtual data.frame (vrt)" which is a data.frame holding key properties of the ee$Image/ee$ImageCollection. The returned list has been assigned a new class "tidyee".

Usage

```
as_tidyee(x, time_end = FALSE)
```

Arguments

x	ee$Image or ee$ImageCollection
time_end	logical include time_end ("system:time_end") in vrt (default=F)

Value

tidyee class object which contains a list with two components ("x","vrt")

Examples

```
## Not run:
library(tidyrgee)
library(rgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)



## End(Not run)
```

---

bgd_msna — *A subset of question responses from the 2019 Host Community MSNA in Bangladesh*

Description

Data frame of responses with anonymized coordinates

Usage

```
bgd_msna
```

Format

A data frame with 1374 rows and 15 variables:

_uuid unique identifier

informed_consent informed consent

survey_date date of survey

end_survey date of end of survey

electricity_grid question about electricity grid

solar_light question about solar light

illness_HH_count repeat group calculation on # hh members with illness in past x days

cooking_fuel/collected_firewood select multiple response - did HH collect firewood for cooking fuel

income_source/agricultural_production_sale income source question - ariculture

agricultural_land question on agricultural land

employment_source/agricultural_casual employment source - ag

employment_source/non_agricultural_casual employment source - non-ag

employment_source/fishing employment source - fishing

_gps_reading_longitude longitude - jittered/anonymized

_gps_reading_latitude latitude - jittered/anonymized ...

Value

data frame

`bind_ics` *bind ImageCollections*

Description

bind ImageCollections

Usage

```
bind_ics(x)
```

Arguments

`x`	list of tidyee objects

Value

tidyee object containing single image collection and vrt

Examples

```
## Not run:
library(tidyrgee)
library(rgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)
modis_tidy_list <- modis_tidy |>
group_split(month)
modis_tidy_list |>
  bind_ics()

## End(Not run)
```

clip *clip flexible wrapper for rgee::ee$Image$clip()*

Description

allows clipping of tidyee,ee$Imagecollection, or ee$Image classes. Also allows objects to be clipped to sf object in addition to ee$FeatureCollections/ee$Feature

Usage

```
clip(x, y, return_tidyee = TRUE)
```

Arguments

x	object to be clipped (tidyee, ee$ImageCollection, ee$Image)
y	geometry object to clip to (sf, ee$Feature,ee$FeatureCollections)
return_tidyee	logical return tidyee class (default = TRUE) object or ee$ImageCollection. Faster performance if F

Value

x as tidyee or ee$Image/ee$ImageCollection depending on return_tidyee argument.

Examples

```
## Not run:
library(tidyrgee)
library(tidyverse)
library(rgee)
rgee::ee_Initialize()

# create geometry and convert to sf
coord_tibble <- tibble::tribble(
  ~X,               ~Y,
  92.2303683692011, 20.9126490153521,
  92.2311567217866, 20.9127410439304,
  92.2287527311594, 20.9124072954926,
  92.2289221219251, 20.9197352745068,
  92.238724724534, 20.9081803233546
)
sf_ob <- sf::st_as_sf(coord_tibble, coords=c("X","Y"),crs=4326)

roi <- ee$Geometry$Polygon(list(
  c(-114.275, 45.891),
  c(-108.275, 45.868),
  c(-108.240, 48.868),
  c(-114.240, 48.891)
))
```

```
# load landsat
ls = ee$ImageCollection("LANDSAT/LC08/C01/T1_SR")

# create tidyee class
ls_tidy <-  as_tidyee(ls)

#  filter_bounds on sf object
#  return tidyee object
ls_tidy |>
  filter_bounds(y = roi,return_tidyee = FALSE) |>
  clip(roi,return_tidyee = FALSE)

# pretty instant with return_tidyee=FALSE
ls_clipped_roi_ic <- ls_tidy |>
  filter_bounds(y = roi,return_tidyee = FALSE) |>
  clip(roi,return_tidyee = FALSE)

# takes more time with return_tidyee=T, but you get the vrt
ls_clipped__roi_tidyee <- ls_tidy |>
  filter_bounds(y = roi,return_tidyee = FALSE) |>
  clip(roi,return_tidyee = TRUE)

# demonstrating on sf object
ls_clipped_sf_ob_ic <- ls_tidy |>
  filter_bounds(y = sf_ob,return_tidyee = FALSE) |>
  clip(roi,return_tidyee = FALSE)

ls_clipped_sf_ob_tidyee <- ls_tidy |>
  filter_bounds(y = roi,return_tidyee = FALSE) |>
  clip(roi,return_tidyee = TRUE)

## End(Not run)
```

`create_tidyee` *create_tidyee*

Description

helper function to assign new tidyee when running `as_tidyee`

Usage

```
create_tidyee(x, vrt)
```

Arguments

`x`	ee$ImageCollection
`vrt`	virtual table

Value

tidyee class list object

`ee_composite` *ee_composite*

Description

ee_composite

Usage

```
ee_composite(x, ...)

## S3 method for class 'tidyee'
ee_composite(x, stat, ...)
```

Arguments

`x`	tidyee object containing `ee$ImageCollection`
`...`	other arguments
`stat`	A `character` indicating what to reduce the ImageCollection by, e.g. 'median' (default), 'mean', 'max', 'min', 'sum', 'sd', 'first'.

Value

tidyee class containing `ee$Image` where all images within `ee$ImageCollection` have been aggregated based on pixel-level stats

---

`ee_extract_tidy` *ee_extract_tidy*

Description

ee_extract_tidy

Usage

```
ee_extract_tidy(
  x,
  y,
  stat = "mean",
  scale,
  via = "getInfo",
  container = "rgee_backup",
  sf = TRUE,
  lazy = FALSE,
  quiet = FALSE,
  ...
)
```

Arguments

x	tidyee, ee$Image, or ee$ImageCollection
y	sf or ee$feature or ee$FeatureCollection
stat	zonal stat ("mean", "median" , "min","max" etc)
scale	A nominal scale in meters of the Image projection to work in. By default 1000.
via	Character. Method to export the image. Three method are implemented: "getInfo", "drive", "gcs".
container	Character. Name of the folder ('drive') or bucket ('gcs') to be exported into (ignore if via is not defined as "drive" or "gcs").
sf	Logical. Should return an sf object?
lazy	Logical. If TRUE, a future::sequential object is created to evaluate the task in the future. Ignore if via is set as "getInfo". See details.
quiet	Logical. Suppress info message.
...	additional parameters

Value

data.frame in long format with point estimates for each time-step and y feature based on statistic provided

See Also

ee_extract for information about ee_extract on ee$ImageCollections and ee$Images

Examples

```
## Not run:
library(rgee)
library(tidyrgee)
ee_Initizialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
```

```
point_sample_buffered <- tidyrgee::bgd_msna |>
    sample_n(3) |>
    sf::st_as_sf(coords=c("_gps_reading_longitude",
                          "_gps_reading_latitude"), crs=4326) |>
    sf::st_transform(crs=32646) |>
    sf::st_buffer(dist = 500) |>
    dplyr::select(`_uuid`)
modis_ic_tidy <- as_tidyee(modis_ic)
modis_monthly_baseline_mean <- modis_ic_tidy |>
 select("NDVI") |>
 filter(year %in% 2000:2015) |>
  group_by(month) |>
 summarise(stat="mean")

ndvi_monthly_mean_at_pt<- modis_monthly_baseline_mean |>
   ee_extract(y = point_sample_buffered,
             fun="mean",
             scale = 500)

## End(Not run)
```

`ee_month_composite` *Pixel-level composite by month*

Description

Pixel-level composite by month

Usage

```
ee_month_composite(x, ...)

## S3 method for class 'ee.imagecollection.ImageCollection'
ee_month_composite(x, stat, months, ...)

## S3 method for class 'tidyee'
ee_month_composite(x, stat, ...)
```

Arguments

`x`	An earth engine ImageCollection or tidyee class.
`...`	extra args to pass on
`stat`	A `character` indicating what to reduce the ImageCollection by, e.g. 'median' (default), 'mean', 'max', 'min', 'sum', 'sd', 'first'.
`months`	A vector of months, e.g. c(1, 12).

Value

tidyee class containing `ee$Image` or `ee$ImageCollection` with pixels aggregated by month

ee_month_filter *ee_month_filter*

Description

ee_month_filter

Usage

```
ee_month_filter(imageCol, month, ...)
```

Arguments

imageCol	ee$ImageCollection
month	numeric vector containing month values (1-12)
...	other arguments

Value

ee$ImageCollection or ee$Image filtered by month

ee_year_composite *Pixel level composite by year*

Description

Pixel level composite by year

Usage

```
ee_year_composite(x, ...)

## S3 method for class 'ee.imagecollection.ImageCollection'
ee_year_composite(x, stat, year, ...)

## S3 method for class 'tidyee'
ee_year_composite(x, stat, ...)
```

Arguments

x	An earth engine ImageCollection or tidyee class.
...	other arguments
stat	A character indicating what to reduce the ImageCollection by, e.g. 'median' (default), 'mean', 'max', 'min', 'sum', 'sd', 'first'.
year	numeric vector containing years (i.e c(2001,2002,2003))

Value

tidyee class containing ee$Image or ee$ImageCollection with pixels aggregated by year

---

ee_year_filter *ee_year_filter*

Description

ee_year_filter

Usage

```
ee_year_filter(imageCol, year, ...)
```

Arguments

imageCol	ee$ImageCollection
year	numeric vector containing years (i.e c(2001,2002,2003))
...	other arguments

Value

ee$ImageCollection or ee$Image filtered by year

---

ee_year_month_composite *Pixel-level composite by year and month*

Description

Pixel-level composite by year and month

Usage

```
ee_year_month_composite(x, ...)

## S3 method for class 'ee.imagecollection.ImageCollection'
ee_year_month_composite(x, stat, startDate, endDate, months, ...)

## S3 method for class 'tidyee'
ee_year_month_composite(x, stat, ...)
```

Arguments

x	An earth engine ImageCollection or tidyee class.
...	args to pass on.
stat	A character indicating what to reduce the ImageCollection by, e.g. 'median' (default), 'mean', 'max', 'min', 'sum', 'sd', 'first'.
startDate	character format date, e.g. "2018-10-23".
endDate	character format date, e.g. "2018-10-23".
months	numeric vector, e.g. c(1,12).

Value

tidyee class containing ee$Image or ee$ImageCollection with pixels aggregated by year and month

---

ee_year_month_filter *ee_year_month_filter*

Description

ee_year_month_filter

Usage

```
ee_year_month_filter(imageCol, year, month, ...)
```

Arguments

imageCol	ee$ImageCollection
year	numeric vector contain years to filter
month	numeric vector contain months to filter
...	other arguments

Value

ee$ImageCollection or ee$Image filtered by year & month

filter *filter ee$ImageCollections or tidyee objects that contain imageCollections*

Description

filter ee$ImageCollections or tidyee objects that contain imageCollections

Arguments

.data	ImageCollection or tidyee class object
...	other arguments

Value

filtered image or imageCollection form filtered imageCollection

See Also

filter for information about filter on normal data tables.

Examples

```
## Not run:

library(rgee)
library(tidyrgee)
ee_Initialize()
l8 = ee$ImageCollection('LANDSAT/LC08/C01/T1_SR')
l8 |>
    filter(date>"2016-01-01",date<"2016-03-04")


 # example with tidyee ckass
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)

# filter by month
modis_march_april <- modis_ic_tidy |>
filter(month %in% c(3,4))

## End(Not run)
```

filter_bounds *filter_bounds a wrapper for rgee::ee$ImageCollection$filterBounds*

Description

filter_bounds a wrapper for rgee::ee$ImageCollection$filterBounds

Usage

```
filter_bounds(x, y, use_tidyee_index = FALSE, return_tidyee = TRUE)
```

Arguments

x	tidyee object containing ee$ImageCollection or ee$ImageCollection
y	feature to filter bounds by (sf, ee$FeatureCollection, ee$Feature, ee$Geometry)
use_tidyee_index	filter on tidyee_index (default = F) or system_index (by default)
return_tidyee	logical return tidyee class (default = TRUE) object or ee$ImageCollection. Faster performance if set to FALSE

Value

tidyee class or ee$ImageCollection class object with scenes filtered to bounding box of y geometry

Examples

```
## Not run:

library(tidyrgee)
library(tidyverse)
library(rgee)
rgee::ee_Initialize()

# create geometry and convert to sf
coord_tibble <- tibble::tribble(
  ~X,               ~Y,
  92.2303683692011, 20.9126490153521,
  92.2311567217866, 20.9127410439304,
  92.2287527311594, 20.9124072954926,
  92.2289221219251, 20.9197352745068,
  92.238724724534, 20.9081803233546
)
sf_ob <- sf::st_as_sf(coord_tibble, coords=c("X","Y"),crs=4326)

# load landsat
ls = ee$ImageCollection("LANDSAT/LC08/C01/T1_SR")

#create tidyee class
```

```
ls_tidy <-  as_tidyee(ls)

# filter_bounds on sf object
# return tidyee object
ls_tidy |>
  filter_bounds(sf_ob)
# return ee$ImageCollection
ls_tidy |>
  filter_bounds(sf_ob,return_tidyee = FALSE)

# filter_bounds on ee$Geometry object
# return tidyee object
ee_geom_ob <- sf_ob |> rgee::ee_as_sf()
ls_tidy |>
  filter_bounds(ee_geom_ob)



## End(Not run)
```

---

group_by *Group an imageCollection or tidyee object with Imagecollections by a parameter*

Description

Group an imageCollection or tidyee object with Imagecollections by a parameter

Arguments

.data	ee$ImageCollection or tidyee object
...	group_by variables
.add	When FALSE, the default, group_by() will override existing groups. To add to the existing groups, use .add = TRUE. This argument was previously called add, but that prevented creating a new grouping variable called add, and conflicts with our naming conventions.
.drop	Drop groups formed by factor levels that don't appear in the data? The default is TRUE except when .data has been previously grouped with .drop = FALSE. See dplyr::group_by_drop_default() for details.

Value

ee$ImageCollection with grouped_vars attribute

See Also

group_by for information about group_by on normal data tables.

Examples

```
## Not run:
library(tidyrgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic |>
   filter(date>="2016-01-01",date<="2019-12-31") |>
   group_by(year)

## End(Not run)
```

`group_split` *filter ee$ImageCollections or tidyee objects that contain imageCollections*

Description

filter ee$ImageCollections or tidyee objects that contain imageCollections

Arguments

`.tbl`	ImageCollection or tidyee class object
`...`	other arguments
`return_tidyee`	`logical` return tidyee object(default =T), if FALSE - only return ee$ImageCollection

Value

filtered image or imageCollection form filtered imageCollection

See Also

`group_split` for information about filter on normal data tables.

Examples

```
## Not run:

library(rgee)
library(tidyrgee)
ee_Initialize()
l8 = ee$ImageCollection('LANDSAT/LC08/C01/T1_SR')
l8 |>
    filter(date>"2016-01-01",date<"2016-03-04")


 # example with tidyee ckass
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)
```

```
# filter by month
modis_march_april <- modis_ic_tidy |>
filter(month %in% c(3,4))

## End(Not run)
```

`ic_list_to_ic` *ic_list_to_ic*

Description

ic_list_to_ic

Usage

```
ic_list_to_ic(x)
```

Arguments

x	ee list made up of imageCollections

Value

imageCollection

`inner_join` *inner_join bands from different image/ImageCollections based on shared property*

Description

inner_join bands from different image/ImageCollections based on shared property

Arguments

x, y	A pair of tidyee objects containing ee$ImageCollections
by	A character vector of variables to join by.

Value

An object of the same type as x. The output has the following properties: Same number of images as x Total number of bands equal the number of bands in x plus the number of bands in y

See Also

inner_join for information about inner_join on normal data tables.

mutate *mutate columns into tidyee vrt which can later be used to modify tidyee ImageCollection*

Description

mutate columns into tidyee vrt which can later be used to modify tidyee ImageCollection

Arguments

.data	tidyee class object (list of ee_ob, vrt)
...	mutate arguments

Value

return tidyee class object with vrt data.frame mutated.

See Also

mutate for information about mutate on normal data tables.

Examples

```
## Not run:
library(tidyrgee)
library(rgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)

## End(Not run)
```

print.tidyee *print tidyee*

Description

print tidyee

Usage

```
## S3 method for class 'tidyee'
print(x, ...)
```

Arguments

x	tidyee object
...	additional arguments

Value

printed tidyee object

`select` *Select bands from ee$Image or ee$ImageCollection*

Description

Select bands from ee$Image or ee$ImageCollection

Arguments

.data	tidyee class object containing ee$ImageCollection or ee$Image
...	one or more quoted or unquoted expressions separated by commas.

Value

tidyee class object with specified (...) bands selected

See Also

`select` for information about select on normal data tables.

Examples

```
## Not run:
library(tidyrgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)

# select NDVI band
modis_ndvi <- modis_ic_tidy |>
   select("NDVI")

# select NDVI band, but change band to new name
modis_ndvi_renamed <- modis_ic_tidy |>
   select(ndvi_new= "NDVI")



## End(Not run)
```

set_idx *set_idx*

Description

set_idx

Usage

```
set_idx(x, idx_name = "tidyee_index")
```

Arguments

x	tidyee or ee$ImageCollection class object
idx_name	name for index to create (default = "tidyee_index")

Value

tidyee or ee$ImageCollection class object with new index containing sequential 0-based indexing

Examples

```
## Not run:
library(rgee)
library(tidyrgee)
ee_Initialize()
modis_link <- "MODIS/006/MOD13Q1"
modisIC <- ee$ImageCollection(modis_link)
modis_ndvi_tidy <- as_tidyee(modisIC) |>
  select("NDVI")
modis_ndvi_tidy |>


## End(Not run)
```

slice *slice ee$ImageCollections or tidyee objects that contain imageCollections*

Description

slice ee$ImageCollections or tidyee objects that contain imageCollections

Arguments

.data	ImageCollection or tidyee class object
...	other arguments

Value

sliced/filtered image or imageCollection form filtered imageCollection

See Also

slice for information about slice on normal data tables.

Examples

```
## Not run:

library(rgee)
library(tidyrgee)
ee_Initialize()
l8 = ee$ImageCollection('LANDSAT/LC08/C01/T1_SR')
l8 |>
    filter(date>"2016-01-01",date<"2016-03-04")


 # example with tidyee ckass
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic_tidy <- as_tidyee(modis_ic)

# filter by month
modis_march_april <- modis_ic_tidy |>
filter(month %in% c(3,4))

## End(Not run)
```

---

summarise *Summary pixel-level stats for ee$ImageCollection or tidyrgee objects with ImageCollections*

Description

Summary pixel-level stats for ee$ImageCollection or tidyrgee objects with ImageCollections

Usage

```
## S3 method for class 'ee.imagecollection.ImageCollection'
summarise(.data, stat, ...)

## S3 method for class 'tidyee'
summarise(.data, stat, ..., join_bands = TRUE)
```

Arguments

.data	ee$Image or ee$ImageCollection
stat	character stat/function to apply
...	other arguments
join_bands	logical (default= TRUE) if multiple stats selected should bands be joined?

Value

ee$Image or ee$ImageCollection where pixels are summarised by group_by and stat

ee$Image or ee$ImageCollection where pixels are summarised by group_by and stat

ee$Image or ee$ImageCollection where pixels are summarised by group_by and stat

See Also

summarise for information about summarise on normal data tables.

Examples

```
## Not run:
library(tidyrgee)
library(rgee)
ee_Initialize()
modis_ic <- ee$ImageCollection("MODIS/006/MOD13Q1")
modis_ic |>
   filter(date>="2016-01-01",date<="2019-12-31") |>
   group_by(year) |>
   summarise(stat="max")

## End(Not run)
```

---

ungroup *ungroup*

Description

ungroup

Arguments

x	tidyee object
...	ungroup args

Value

tidyee class object with vrt ungrouped.

See Also

ungroup for information about ungroup on normal data tables.

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