Package: terrainr (via r-universe)

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Type Package

Title Landscape Visualizations in R and 'Unity'

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Description Functions for the retrieval, manipulation, and visualization of 'geospatial' data, with an aim towards producing '3D' landscape visualizations in the 'Unity' '3D' rendering engine. Functions are also provided for retrieving elevation data and base map tiles from the 'USGS' National Map <https://apps.nationalmap.gov/services/>.

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URL https://docs.ropensci.org/terrainr/, https://github.com/ropensci/terrainr

BugReports https://github.com/ropensci/terrainr/issues

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`addbuff` *Add a uniform buffer around a bounding box for geographic coordinates*

Description

add_bbox_buffer calculates the great circle distance both corners of your bounding box are from the centroid and extends those by a set distance. Due to using Haversine/great circle distance, latitude/longitude calculations will not be exact.

set_bbox_side_length is a thin wrapper around add_bbox_buffer which sets all sides of the bounding box to (approximately) a specified length.

Both of these functions are intended to be used with geographic coordinate systems (data using longitude and latitude for position). For projected coordinate systems, a more sane approach is to use sf::st_buffer to add a buffer, or combine sf::st_centroid with the buffer to set a specific side length.

Usage

```
add_bbox_buffer(data, distance, distance_unit = "meters", error_crs = NULL)

## S3 method for class 'sf'
add_bbox_buffer(data, distance, distance_unit = "meters", error_crs = NULL)

## S3 method for class 'Raster'
add_bbox_buffer(data, distance, distance_unit = "meters", error_crs = NULL)

## S3 method for class 'SpatRaster'
```

```
add_bbox_buffer(data, distance, distance_unit = "meters", error_crs = NULL)

set_bbox_side_length(
  data,
  distance,
  distance_unit = "meters",
  error_crs = NULL
)

## S3 method for class 'sf'
set_bbox_side_length(
  data,
  distance,
  distance_unit = "meters",
  error_crs = NULL
)

## S3 method for class 'Raster'
set_bbox_side_length(
  data,
  distance,
  distance_unit = "meters",
  error_crs = NULL
)

## S3 method for class 'SpatRaster'
set_bbox_side_length(
  data,
  distance,
  distance_unit = "meters",
  error_crs = NULL
)
```

Arguments

`data`	The original data to add a buffer around. Must be either an `sf` or `SpatRaster` object.
`distance`	The distance to add or to set side lengths equal to.
`distance_unit`	The units of the distance to add to the buffer, passed to units::as_units.
`error_crs`	Logical: Should this function error if `data` has no CRS? If `TRUE`, function errors; if `FALSE`, function quietly assumes EPSG:4326. If `NULL`, the default, function assumes EPSG:4326 with a warning.

Value

An `sfc` object (from sf::st_as_sfc).

See Also

Other utilities: calc_haversine_distance(), deg_to_rad(), get_centroid(), rad_to_deg()

Examples

```
df <- data.frame(
  lat = c(44.04905, 44.17609),
  lng = c(-74.01188, -73.83493)
)

df_sf <- sf::st_as_sf(df, coords = c("lng", "lat"))
df_sf <- sf::st_set_crs(df_sf, 4326)

add_bbox_buffer(df_sf, 10)

df <- data.frame(
  lat = c(44.04905, 44.17609),
  lng = c(-74.01188, -73.83493)
)

df_sf <- sf::st_as_sf(df, coords = c("lng", "lat"))
df_sf <- sf::st_set_crs(df_sf, 4326)

set_bbox_side_length(df_sf, 4000)
```

---

combine_overlays *Combine multiple image overlays into a single file*

Description

This function combines any number of images into a single file, which may then be further processed as an image or transformed into an image overlay.

Usage

```
combine_overlays(
  ...,
  output_file = tempfile(fileext = ".png"),
  transparency = 0
)
```

Arguments

...	File paths for images to be combined. Note that combining TIFF images requires the tiff package be installed.
output_file	The path to save the resulting image to. Can be any format accepted by magick::image_read. Optionally, can be set to NULL, in which case this function will return the image as a magick object instead of writing to disk.

transparency A value indicating how much transparency should be added to each image. If less than 1, interpreted as a proportion (so a value of 0.1 results in each image becoming 10% more transparent); if between 1 and 100, interpreted as a percentage (so a value of 10 results in each image becoming 10% more transparent.) A value of 0 is equivalent to no additional transparency.

Value

If `output_file` is not null, `output_file`, invisibly. If `output_file` is null, a `magick` image object.

See Also

Other data manipulation functions: `georeference_overlay()`, `merge_rasters()`, `raster_to_raw_tiles()`, `vector_to_overlay()`

Other overlay creation functions: `georeference_overlay()`, `vector_to_overlay()`

Other visualization functions: `geom_spatial_rgb()`, `raster_to_raw_tiles()`, `vector_to_overlay()`

Examples

```
## Not run:
# Generate points and download orthoimagery
mt_elbert_points <- data.frame(
  lat = runif(100, min = 39.11144, max = 39.12416),
  lng = runif(100, min = -106.4534, max = -106.437)
)

mt_elbert_sf <- sf::st_as_sf(mt_elbert_points, coords = c("lng", "lat"))
sf::st_crs(mt_elbert_sf) <- sf::st_crs(4326)

output_files <- get_tiles(
  mt_elbert_sf,
  output_prefix = tempfile(),
  services = c("ortho")
)

# Merge orthoimagery into a single file
ortho_merged <- merge_rasters(
  input_rasters = output_files[1],
  output_raster = tempfile(fileext = ".tif")
)

# Convert our points into an overlay
mt_elbert_overlay <- vector_to_overlay(mt_elbert_sf,
  ortho_merged[[1]],
  size = 15,
  color = "red",
  na.rm = TRUE
)

# Combine the overlay with our orthoimage
ortho_with_points <- combine_overlays(
```

```
  ortho_merged[[1]],
  mt_elbert_overlay
)

## End(Not run)
```

`geom_spatial_rgb` *Plot RGB rasters in ggplot2*

Description

`geom_spatial_rgb` and `stat_spatial_rgb` allow users to plot three-band RGB rasters in ggplot2, using these layers as background base maps for other spatial plotting. Note that unlike ggplot2::geom_sf, this function does *not* force ggplot2::coord_sf; for accurate mapping, add ggplot2::coord_sf with a `crs` value matching your input raster as a layer.

Usage

```
geom_spatial_rgb(
  mapping = NULL,
  data = NULL,
  stat = "spatialRGB",
  position = "identity",
  ...,
  hjust = 0.5,
  vjust = 0.5,
  interpolate = FALSE,
  na.rm = FALSE,
  show.legend = NA,
  inherit.aes = TRUE,
  scale = NULL
)

stat_spatial_rgb(
  mapping = NULL,
  data = NULL,
  geom = "raster",
  position = "identity",
  na.rm = FALSE,
  show.legend = FALSE,
  inherit.aes = TRUE,
  scale = NULL,
  ...
)
```

Arguments

mapping	Set of aesthetic mappings created by aes(). If specified and inherit.aes = TRUE (the default), it is combined with the default mapping at the top level of the plot. You must supply mapping if there is no plot mapping.
data	The data to be displayed in this layer. In addition to the three options described in ggplot2::geom_raster, there are two additional methods: If a SpatRaster object (see terra::rast), this function will coerce the raster to a data frame and assume the raster bands are in RGB order (while allowing for, but ignoring, a fourth alpha band). If a length-1 character vector, this function will attempt to load the object via terra::rast.
stat	The statistical transformation to use on the data for this layer. When using a geom_*() function to construct a layer, the stat argument can be used the override the default coupling between geoms and stats. The stat argument accepts the following: • A Stat ggproto subclass, for example StatCount. • A string naming the stat. To give the stat as a string, strip the function name of the stat_ prefix. For example, to use stat_count(), give the stat as "count". • For more information and other ways to specify the stat, see the layer stat documentation.
position	A position adjustment to use on the data for this layer. This can be used in various ways, including to prevent overplotting and improving the display. The position argument accepts the following: • The result of calling a position function, such as position_jitter(). This method allows for passing extra arguments to the position. • A string naming the position adjustment. To give the position as a string, strip the function name of the position_ prefix. For example, to use position_jitter(), give the position as "jitter". • For more information and other ways to specify the position, see the layer position documentation.
...	Other arguments passed on to layer()'s params argument. These arguments broadly fall into one of 4 categories below. Notably, further arguments to the position argument, or aesthetics that are required can *not* be passed through .... Unknown arguments that are not part of the 4 categories below are ignored. • Static aesthetics that are not mapped to a scale, but are at a fixed value and apply to the layer as a whole. For example, colour = "red" or linewidth = 3. The geom's documentation has an **Aesthetics** section that lists the available options. The 'required' aesthetics cannot be passed on to the params. Please note that while passing unmapped aesthetics as vectors is technically possible, the order and required length is not guaranteed to be parallel to the input data. • When constructing a layer using a stat_*() function, the ... argument can be used to pass on parameters to the geom part of the layer. An example of this is stat_density(geom = "area", outline.type = "both"). The geom's documentation lists which parameters it can accept.

- Inversely, when constructing a layer using a `geom_*()` function, the `...` argument can be used to pass on parameters to the `stat` part of the layer. An example of this is `geom_area(stat = "density", adjust = 0.5)`. The stat's documentation lists which parameters it can accept.
- The `key_glyph` argument of `layer()` may also be passed on through `...`. This can be one of the functions described as key glyphs, to change the display of the layer in the legend.

`hjust, vjust` horizontal and vertical justification of the grob. Each justification value should be a number between 0 and 1. Defaults to 0.5 for both, centering each pixel over its data location.

`interpolate` If `TRUE` interpolate linearly, if `FALSE` (the default) don't interpolate.

`na.rm` If `FALSE`, the default, missing values are removed with a warning. If `TRUE`, missing values are silently removed.

`show.legend` logical. Should this layer be included in the legends? `NA`, the default, includes if any aesthetics are mapped. `FALSE` never includes, and `TRUE` always includes. It can also be a named logical vector to finely select the aesthetics to display.

`inherit.aes` If `FALSE`, overrides the default aesthetics, rather than combining with them. This is most useful for helper functions that define both data and aesthetics and shouldn't inherit behaviour from the default plot specification, e.g. `borders()`.

`scale` Integer. Maximum (possible) value in the three channels. If `NULL`, attempts to infer proper values from data – if all RGB values are <= 1 then 1, <= 255 then 255, and otherwise 65535.

`geom` The geometric object to use to display the data for this layer. When using a `stat_*()` function to construct a layer, the `geom` argument can be used to override the default coupling between stats and geoms. The `geom` argument accepts the following:

- A `Geom` ggproto subclass, for example `GeomPoint`.
- A string naming the geom. To give the geom as a string, strip the function name of the `geom_` prefix. For example, to use `geom_point()`, give the geom as `"point"`.
- For more information and other ways to specify the geom, see the layer geom documentation.

See Also

Other visualization functions: `combine_overlays()`, `raster_to_raw_tiles()`, `vector_to_overlay()`

Examples

```
## Not run:

simulated_data <- data.frame(
  id = seq(1, 100, 1),
  lat = runif(100, 44.04905, 44.17609),
  lng = runif(100, -74.01188, -73.83493)
)
```

```
simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))
simulated_data <- sf::st_set_crs(simulated_data, 4326)

output_tiles <- get_tiles(simulated_data,
  services = c("ortho"),
  resolution = 120
)

merged_ortho <- tempfile(fileext = ".tif")
merge_rasters(output_tiles[["ortho"]], merged_ortho)

merged_stack <- terra::rast(merged_ortho)

library(ggplot2)

ggplot() +
  geom_spatial_rgb(
    data = merged_ortho,
    mapping = aes(
      x = x,
      y = y,
      r = red,
      g = green,
      b = blue
    )
  ) +
  geom_sf(data = simulated_data) +
  coord_sf(crs = 4326)

ggplot() +
  geom_spatial_rgb(
    data = merged_stack,
    mapping = aes(
      x = x,
      y = y,
      r = red,
      g = green,
      b = blue
    )
  ) +
  geom_sf(data = simulated_data) +
  coord_sf(crs = 4326)

## End(Not run)
```

`georeference_overlay` *Georeference image overlays based on a reference raster*

Description

This function georeferences an image overlay based on a reference raster, setting the extent and CRS of the image to those of the raster file. To georeference multiple images and merge them into a single file, see merge_rasters.

Usage

```
georeference_overlay(
  overlay_file,
  reference_raster,
  output_file = tempfile(fileext = ".tif")
)
```

Arguments

overlay_file	The image overlay to georeference. File format will be detected automatically from file extension; options include jpeg/jpg, png, and tif/tiff.
reference_raster	The raster file to base georeferencing on. The output image will have the same extent and CRS as the reference raster. Accepts anything that can be read by terra::rast
output_file	The path to write the georeferenced image file to. Must be a TIFF.

Value

The file path written to, invisibly.

See Also

Other data manipulation functions: combine_overlays(), merge_rasters(), raster_to_raw_tiles(), vector_to_overlay()

Other overlay creation functions: combine_overlays(), vector_to_overlay()

Examples

```
## Not run:
simulated_data <- data.frame(
  id = seq(1, 100, 1),
  lat = runif(100, 44.1114, 44.1123),
  lng = runif(100, -73.92273, -73.92147)
)

simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))

downloaded_tiles <- get_tiles(simulated_data,
  services = c("elevation", "ortho"),
  georeference = FALSE
)
```

```
georeference_overlay(
  overlay_file = downloaded_tiles[[2]],
  reference_raster = downloaded_tiles[[1]],
  output_file = tempfile(fileext = ".tif")
)

## End(Not run)
```

---

get_tiles *A user-friendly way to get USGS National Map data tiles for an area*

Description

This function splits the area contained within a bounding box into a set of tiles, and retrieves data from the USGS National map for each tile. As of version 0.5.0, the method for lists has been deprecated.

Usage

```
get_tiles(
  data,
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)

## S3 method for class 'sf'
get_tiles(
  data,
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)

## S3 method for class 'sfc'
get_tiles(
  data,
```

```
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)

## S3 method for class 'Raster'
get_tiles(
  data,
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)

## S3 method for class 'SpatRaster'
get_tiles(
  data,
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)

## S3 method for class 'list'
get_tiles(
  data,
  output_prefix = tempfile(),
  side_length = NULL,
  resolution = 1,
  services = "elevation",
  verbose = FALSE,
  georeference = TRUE,
  projected = NULL,
  ...
)
```

Arguments

`data`	An `sf` or `SpatRaster` object; tiles will be downloaded for the full extent of the provided object.
`output_prefix`	The file prefix to use when saving tiles.
`side_length`	The length, in meters, of each side of tiles to download. If `NULL`, defaults to the maximum side length permitted by the least permissive service requested.
`resolution`	How many meters are represented by each pixel? The default value of 1 means that 1 pixel = 1 meter, while a value of 2 means that 1 pixel = 2 meters, and so on.
`services`	A character vector of services to download data from. Current options include "3DEPElevation", "USGSNAIPPlus", and "nhd". Users can also use short codes to download a specific type of data without specifying the source; current options for short codes include "elevation" (equivalent to "3DEPElevation"), "ortho" (equivalent to "USGSNAIPPlus), and "hydro" ("nhd"). Short codes are not guaranteed to refer to the same source across releases. Short codes are converted to their service name and then duplicates are removed, so any given source will only be queried once per tile.
`verbose`	Logical: should tile retrieval functions run in verbose mode?
`georeference`	Logical: should tiles be downloaded as PNGs without georeferencing, or should they be downloaded as georeferenced TIFF files? This option does nothing when only elevation data is being downloaded.
`projected`	Logical: is `data` in a projected coordinate reference system? If `NULL`, the default, inferred from sf::st_is_longlat.
`...`	Additional arguments passed to hit_national_map_api. These can be used to change default query parameters or as additional options for the National Map services. See below for more details.

Value

A list of the same length as the number of unique services requested, containing named vectors of where data files were saved to. Returned invisibly.

Available Datasources

The following services are currently available (with short codes in parentheses where applicable). See links for API documentation.

- 3DEPElevation (short code: elevation)
- USGSNAIPPlus (short code: ortho)
- USGSNAIPImagery
- nhd (short code: hydro)
- govunits
- contours
- geonames

- NHDPlus_HR
- structures
- transportation
- wbd ("short code": watersheds)
- ecosystems
- USGSTopo
- USGSShadedReliefOnly
- USGSImageryOnly
- USGSHydroCached

Additional Arguments

The ... argument can be used to pass additional arguments to the National Map API or to edit the hard-coded defaults used by this function. More information on common arguments to change can be found in hit_national_map_api. Note that ... can also be used to change the formats returned by the server, but that doing so while using this function will likely cause the function to error (or corrupt the output data). To download files in different formats, use hit_national_map_api.

See Also

Other data retrieval functions: `hit_national_map_api()`

Examples

```
## Not run:
simulated_data <- data.frame(
  id = seq(1, 100, 1),
  lat = runif(100, 44.04905, 44.17609),
  lng = runif(100, -74.01188, -73.83493)
)

simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))

get_tiles(simulated_data, tempfile())

## End(Not run)
```

---

make_manifest *Transform rasters and write manifest file for import into Unity*

Description

These functions crop input raster files into smaller square tiles and then converts them into either .png or .raw files which are ready to be imported into the Unity game engine. make_manifest also writes a "manifest" file and importer script which may be used to automatically import the tiles into Unity.

Usage

```
make_manifest(
  heightmap,
  overlay = NULL,
  output_prefix = "import",
  manifest_path = "terrainr.manifest",
  importer_path = "import_terrain.cs"
)

transform_elevation(heightmap, side_length = 4097, output_prefix = "import")

transform_overlay(overlay, side_length = 4097, output_prefix = "import")
```

Arguments

heightmap	File path to the heightmap to transform.
overlay	File path to the image overlay to transform. Optional for make_manifest.
output_prefix	The file path to prefix output tiles with.
manifest_path	File path to write the manifest file to.
importer_path	File name to write the importer script to. Set to NULL to not copy the importer script. Will overwrite any file at the same path.
side_length	Side length, in pixels, of each output tile. If the raster has dimensions not evenly divisible by side_length, tiles will be generated with overhanging pieces set to 0 units of elevation or RGB 0 (pure black). Side lengths not equal to 2^x + 1 (for x <= 12) will cause a warning, as tiles must be this size for import into Unity.

Value

manifest_path, invisibly.

Examples

```
## Not run:
if (!isTRUE(as.logical(Sys.getenv("CI")))) {
  simulated_data <- data.frame(
    id = seq(1, 100, 1),
    lat = runif(100, 44.04905, 44.17609),
    lng = runif(100, -74.01188, -73.83493)
  )
  simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))
  output_files <- get_tiles(simulated_data)
  temptiff <- tempfile(fileext = ".tif")
  merge_rasters(output_files["elevation"][[1]], temptiff)
  make_manifest(temptiff, output_prefix = tempfile(), importer_path = NULL)
}

## End(Not run)
```

make_unity *Initialize terrain inside of a Unity project.*

Description

Initialize terrain inside of a Unity project.

Usage

```
make_unity(
  project,
  heightmap,
  overlay = NULL,
  side_length = 4097,
  scene_name = "terrainr_scene",
  action = TRUE,
  unity = find_unity()
)
```

Arguments

project	The directory path of the Unity project to create terrain inside.
heightmap	The file path for the raster to transform into terrain.
overlay	Optionally, a file path for an image overlay to layer on top of the terrain surface. Leave as NULL for no overlay.
side_length	The side length, in map units, for the terrain tiles. Must be equal to 2^x + 1, for any x between 5 and 12.
scene_name	The name of the Unity scene to create the terrain in.
action	Boolean: Execute the unifir "script" and create the Unity project? If FALSE, returns a non-executed script.
unity	The location of the Unity executable to create projects with. By default, will be auto-detected by unifir::find_unity

Value

An object of class "unifir_script", containing either an executed unifir script (if action = TRUE) or a non-executed script object (if action = FALSE).

Examples

```
## Not run:
if (!isTRUE(as.logical(Sys.getenv("CI")))) {
  simulated_data <- data.frame(
    id = seq(1, 100, 1),
    lat = runif(100, 44.04905, 44.17609),
    lng = runif(100, -74.01188, -73.83493)
```

```
  )
  simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))
  output_files <- get_tiles(simulated_data)
  temptiff <- tempfile(fileext = ".tif")
  merge_rasters(output_files["elevation"][[1]], temptiff)
  make_unity(file.path(tempdir(), "unity"), temptiff)
}

## End(Not run)
```

`merge_rasters` *Merge multiple raster files into a single raster*

Description

Some functions like get_tiles return multiple separate files when it can be useful to have a single larger raster instead. This function is a thin wrapper over sf::gdal_utils, making it easy to collapse those multiple raster files into a single TIFF.

Usage

```
merge_rasters(
  input_rasters,
  output_raster = tempfile(fileext = ".tif"),
  options = character(0),
  overwrite = FALSE,
  force_fallback = FALSE
)
```

Arguments

`input_rasters`	A character vector containing the file paths to the georeferenced rasters you want to use.
`output_raster`	The file path to save the merged georeferenced raster to.
`options`	Optionally, a character vector of options to be passed directly to sf::gdal_utils. If the fallback is used and any options (other than "-overwrite") are specified, this will issue a warning.
`overwrite`	Logical: overwrite `output_raster` if it exists? If FALSE and the file exists, this function will fail with an error. The behavior if this argument is TRUE and "-overwrite" is passed to `options` directly is not stable.
`force_fallback`	Logical: if TRUE, uses the much slower fallback method by default. This is used for testing purposes and is not recommended for use by end users.

Value

`output_raster`, invisibly.

See Also

Other data manipulation functions: combine_overlays(), georeference_overlay(), raster_to_raw_tiles(), vector_to_overlay()

Examples

```
## Not run:
simulated_data <- data.frame(
  lat = c(44.10379, 44.17573),
  lng = c(-74.01177, -73.91171)
)

simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))

img_files <- get_tiles(simulated_data)
merge_rasters(img_files[[1]])

## End(Not run)
```

---

raster_to_raw_tiles *Crop a raster and convert the output tiles into new formats.*

Description

This function has been deprecated as of terrainr 0.5.0 in favor of the new function, make_manifest. While it will be continued to be exported until at least 2022, improvements and bug fixes will only be made to the new function. Please open an issue if any features you relied upon is missing from the new function!

Usage

```
raster_to_raw_tiles(input_file, output_prefix, side_length = 4097, raw = TRUE)
```

Arguments

input_file	File path to the input TIFF file to convert.
output_prefix	The file path to prefix output tiles with.
side_length	The side length, in pixels, for the .raw tiles.
raw	Logical: Convert the cropped tiles to .raw? When FALSE returns a .png.

Details

This function crops input raster files into smaller square tiles and then converts them into either .png or .raw files which are ready to be imported into the Unity game engine.

Value

Invisibly, a character vector containing the file paths that were written to.

See Also

Other data manipulation functions: `combine_overlays()`, `georeference_overlay()`, `merge_rasters()`, `vector_to_overlay()`

Other visualization functions: `combine_overlays()`, `geom_spatial_rgb()`, `vector_to_overlay()`

Examples

```
## Not run:
if (!isTRUE(as.logical(Sys.getenv("CI")))) {
  simulated_data <- data.frame(
    id = seq(1, 100, 1),
    lat = runif(100, 44.04905, 44.17609),
    lng = runif(100, -74.01188, -73.83493)
  )
  simulated_data <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))
  output_files <- get_tiles(simulated_data)
  temptiff <- tempfile(fileext = ".tif")
  merge_rasters(output_files["elevation"][[1]], temptiff)
  raster_to_raw_tiles(temptiff, tempfile())
}

## End(Not run)
```

---

vector_to_overlay *Turn spatial vector data into an image overlay*

Description

This function allows users to quickly transform any vector data into an image overlay, which may then be imported as a texture into Unity.

Usage

```
vector_to_overlay(
  vector_data,
  reference_raster,
  output_file = NULL,
  transparent = "#ffffff",
  ...,
  error_crs = NULL
)
```

Arguments

vector_data	The spatial vector data set to be transformed into an overlay image. Users may provide either an sf object or a length 1 character vector containing a path to a file readable by sf::read_sf.
reference_raster	The raster file to produce an overlay for. The output overlay will have the same extent and resolution as the input raster. Users may provide either a Raster* object or a length 1 character vector containing a path to a file readable by terra::rast.
output_file	The path to save the image overlay to. If NULL, saves to a tempfile.
transparent	The hex code for a color to be made transparent in the final image. Set to FALSE to not set any colors to transparent.
...	Arguments passed to ... in either ggplot2::geom_point (for point vector data), ggplot2::geom_line (for line data), or ggplot2::geom_polygon (for all other data types).
error_crs	Logical: Should this function error if data has no CRS? If TRUE, function errors; if FALSE, function quietly assumes EPSG:4326. If NULL, the default, function assumes EPSG:4326 with a warning.

Value

output_file, invisibly.

See Also

Other data manipulation functions: combine_overlays(), georeference_overlay(), merge_rasters(), raster_to_raw_tiles()

Other overlay creation functions: combine_overlays(), georeference_overlay()

Other visualization functions: combine_overlays(), geom_spatial_rgb(), raster_to_raw_tiles()

Examples

```
## Not run:

# Generate points to download raster tiles for
set.seed(123)
simulated_data <- data.frame(
  id = seq(1, 100, 1),
  lat = runif(100, 44.1114, 44.1123),
  lng = runif(100, -73.92273, -73.92147)
)

# Create an sf object from our original simulated data

simulated_data_sf <- sf::st_as_sf(simulated_data, coords = c("lng", "lat"))
sf::st_crs(simulated_data_sf) <- sf::st_crs(4326)

# Download data!
```

```
downloaded_tiles <- get_tiles(simulated_data_sf, tempfile())

merged_file <- merge_rasters(
  downloaded_tiles[[1]],
  tempfile(fileext = ".tif")
)


# Create an overlay image
vector_to_overlay(simulated_data_sf, merged_file[[1]], na.rm = TRUE)

## End(Not run)
```

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