

Package ‘geomorphR’

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Type Package

Title Geometric Features and Footprint Comparison for 'sf' Objects

Version 0.2.0

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Description Extracts reproducible geometric and urban-morphology descriptors from polygon and multipart polygon building footprints stored as 'sf' objects, including area, perimeter, compactness, shape, topology, convexity, orientation, and optional building-height and floor-area metrics. Compares polygon footprints across periods using the intersection-over-union (Jaccard) index (Jaccard, 1912) <doi:10.1111/j.1469-8137.1912.tb05611.x> to identify new constructions, potential demolitions, and footprint changes. Supports vector file formats readable by 'sf', including Shapefiles and GeoPackage (GPKG) vector files with named layers, optional boundary clipping, and reprojection to a common coordinate reference system. Returned 'sf' objects preserve source attributes and geometry for spatial analysis and downstream workflows, with optional parallel processing using 'future' for larger feature-extraction jobs.

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URL <https://github.com/MakiJota/geomorphR>

BugReports <https://github.com/MakiJota/geomorphR/issues>

Encoding UTF-8

Imports sf, dplyr, future, future.apply, progressr

Suggests testthat (>= 3.0.0)

Config/roxygen2/version 8.1.0

NeedsCompilation no

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compare_footprints	<i>Compare polygon footprints across two spatial files</i>
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Description

Reads polygon layers from two vector files and compares their footprints using intersection-over-union (IoU). Inputs may be Shapefiles, GeoPackages, or other formats supported by `sf::st_read()`. For a GeoPackage containing multiple layers, pass the desired layer names with `layer1` and `layer2`.

Usage

```
compare_footprints(  
  file1,  
  file2,  
  layer1 = NULL,  
  layer2 = NULL,  
  boundary_path = NULL,  
  boundary_layer = NULL,  
  similarity_threshold = 0.7,  
  overlap_demolition_threshold = 20,  
  year_col = "Year_of_Co",  
  year_change_threshold = 2,  
  replacement_iou_threshold = 0.5,  
  period1 = NULL,  
  period2 = NULL,  
  is_last_period = FALSE,  
  make_valid = TRUE,  
  verbose = TRUE  
)
```

Arguments

- `file1, file2` Character paths to the earlier and later spatial files.
- `layer1, layer2` Optional layer names to read from `file1` and `file2`. These are useful when either file is a GeoPackage with multiple layers.
- `boundary_path` Optional path to a polygon boundary file used to clip both input layers before comparison.
- `boundary_layer` Optional layer name when `boundary_path` contains multiple layers.

similarity_threshold	Numeric IoU threshold between 0 and 1 for treating footprints as the same building. Defaults to 0.7.
overlap_demolition_threshold	Numeric percentage threshold between 0 and 100 below which an identified demolition is marked as a potential demolition.
year_col	Optional name of a numeric construction-year column present in both layers. Defaults to "Year_of_Co"; year-based replacement detection is skipped if this column is absent from both layers.
year_change_threshold	Numeric construction-year difference that must be exceeded to mark a building as replaced. Defaults to 2 years.
replacement_iou_threshold	Numeric IoU threshold between 0 and 1 used with year_change_threshold to identify replacement demolitions. Defaults to 0.5.
period1, period2	Optional labels for the compared periods. By default, the input file names are used.
is_last_period	Logical; if TRUE, demolition results are not calculated for the first layer.
make_valid	Logical; repair invalid input geometries before comparing.
verbose	Logical; report progress and CRS transformations.

Value

A list of sf objects: new_constructions, clean_constructions, demolitions, gdf1_enriched, and gdf2_enriched. The enriched layers contain the comparison attributes; results are returned in memory and are not written to disk.

extract_geometric_features

Extract geometric and morphological descriptors from polygonal building footprints

Description

Computes footprint descriptors and optional building morphology metrics for an sf object containing POLYGON or MULTIPOLYGON geometries.

Usage

```
extract_geometric_features(
  buildings_sf,
  verbose = TRUE,
  use_parallel = FALSE,
  n_cores = NULL,
```

```

    make_valid = TRUE,
    height_col = NULL,
    floors_col = NULL,
    orientation_col = NULL,
    gfa_col = NULL,
    plot_area_col = NULL
  )

```

Arguments

<code>buildings_sf</code>	An sf object with POLYGON or MULTIPOLYGON geometries.
<code>verbose</code>	Logical; print progress messages when TRUE.
<code>use_parallel</code>	Logical; optional future-based parallel computation.
<code>n_cores</code>	Integer or NULL; number of workers used by future.apply.
<code>make_valid</code>	Logical; call <code>sf::st_make_valid()</code> before extraction.
<code>height_col</code>	Character scalar naming building height in source units.
<code>floors_col</code>	Character scalar naming the number of floors/storeys.
<code>orientation_col</code>	Optional character scalar naming building orientation in degrees.
<code>gfa_col</code>	Optional character scalar naming gross floor area.
<code>plot_area_col</code>	Optional character scalar naming plot/parcel area.

Value

An sf object with appended geometry and morphology features.

`validate_morphology_columns`

Validate source columns used by morphology metrics

Description

Validate source columns used by morphology metrics

Usage

```

validate_morphology_columns(
  buildings_sf,
  height_col = NULL,
  floors_col = NULL,
  orientation_col = NULL,
  gfa_col = NULL,
  plot_area_col = NULL
)

```

Arguments

<code>buildings_sf</code>	An sf object or data frame containing source columns.
<code>height_col</code>	Character scalar naming building height.
<code>floors_col</code>	Character scalar naming the number of floors/storeys.
<code>orientation_col</code>	Character scalar naming building orientation in degrees.
<code>gfa_col</code>	Character scalar naming gross floor area.
<code>plot_area_col</code>	Character scalar naming plot/parcel area.

Value

A data frame with one row per requested field and validation status.

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