

Package ‘lwgeom’

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Title Bindings to Selected 'liblwgeom' Functions for Simple Features

Description Access to selected functions found in 'liblwgeom' <<https://github.com/postgis/postgis/tree/master/liblwgeom>>, the light-weight geometry library used by 'PostGIS' <<http://postgis.net/>>.

Depends R (>= 3.3.0)

Imports Rcpp, units, sf (>= 0.9-3)

Suggests covr, sp, geosphere, testthat

LinkingTo Rcpp, sf (>= 0.6-0)

SystemRequirements GEOS (>= 3.5.0), PROJ (>= 4.8.0), sqlite3

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URL <https://github.com/r-spatial/lwgeom/>

BugReports <https://github.com/r-spatial/lwgeom/issues/>

Collate init.R RcppExports.R geohash.R split.R subdivide.R valid.R transform.R bounding_circle.R bearing.R snap_to_grid.R startpoint.R twkb.R perimeter.R clockwise.R geod.R wkt.R wrap_x.R

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R topics documented:

bounding_circle	2
geod	3
lwgeom_extSoftVersion	4
lwgeom_make_valid	5
perimeter	5
st_astext	6
st_as_sfc.TWKB	6
st_force_polygon_cw	7
st_geod_azimuth	8
st_geohash	8
st_is_polygon_cw	9
st_linesubstring	9
st_snap_to_grid	10
st_split	11
st_startpoint	12
st_subdivide	12
st_transform_proj	13
st_wrap_x	14
Index	16

bounding_circle	<i>Generate the minimum bounding circle</i>
-----------------	---

Description

Generate the minimum bounding circle

Usage

```
st_minimum_bounding_circle(x, nQuadSegs = 30)
```

Arguments

x	object of class sfg, sfg or sf
nQuadSegs	number of segments per quadrant (passed to st_buffer)

Details

st_minimum_bounding_circle uses the lwgeom_calculate_mbc method also used by the PostGIS command ST_MinimumBoundingCircle.

Value

Object of the same class as x

Examples

```
library(sf)

x = st_multipoint(matrix(c(0,1,0,1),2,2))
y = st_multipoint(matrix(c(0,0,1,0,1,1),3,2))

mbcx = st_minimum_bounding_circle(x)
mbcy = st_minimum_bounding_circle(y)

if (.Platform$OS.type != "windows") {
  plot(mbcx, axes=TRUE); plot(x, add=TRUE)
  plot(mbcy, axes=TRUE); plot(y, add=TRUE)
}

nc = st_read(system.file("gpkg/nc.gpkg", package="sf"))
state = st_union(st_geometry(nc))

if (.Platform$OS.type != "windows") {
  plot(st_minimum_bounding_circle(state), asp=1)
  plot(state, add=TRUE)
}
```

geod

liblwgeom geodetic functions

Description

liblwgeom geodetic functions for length, area, segmentizing, covers

Usage

```
st_geod_area(x)

st_geod_length(x)

st_geod_segmentize(x, max_seg_length)

st_geod_covers(x, y, sparse = TRUE)

st_geod_covered_by(x, y, sparse = TRUE)

st_geod_distance(x, y, tolerance = 0, sparse = FALSE)
```

Arguments

x object of class sf, sfc or sfg
max_seg_length segment length in degree, radians, or as a length unit (e.g., m)

y	object of class sf, sfc or sfg
sparse	logical; if TRUE, return a sparse matrix (object of class sgbp), otherwise, return a dense logical matrix.
tolerance	double or length units value: if positive, the first distance less than tolerance is returned, rather than the true distance

Details

st_area will give an error message when the area spans the equator and lwgeom is linked to a proj.4 version older than 4.9.0 (see [lwgeom_extSoftVersion](#))

longitude coordinates returned are rescaled to [-180,180)

Note

this function should is used by [st_distance](#), do not use it directly

Examples

```
library(sf)
nc = st_read(system.file("gpkg/nc.gpkg", package="sf"))
st_geod_area(nc[1:3,])
# st_area(nc[1:3,])
l = st_sfc(st_linestring(rbind(c(7,52), c(8,53))), crs = 4326)
st_geod_length(l)
library(units)
pol = st_polygon(list(rbind(c(0,0), c(0,60), c(60,60), c(0,0))))
x = st_sfc(pol, crs = 4326)
seg = st_geod_segmentize(x[1], set_units(10, km))
plot(seg, graticule = TRUE, axes = TRUE)
pole = st_polygon(list(rbind(c(0,80), c(120,80), c(240,80), c(0,80))))
pt = st_point(c(0,90))
x = st_sfc(pole, pt, crs = 4326)
st_geod_covers(x[c(1,1,1)], x[c(2,2,2,2)])
pole = st_polygon(list(rbind(c(0,80), c(120,80), c(240,80), c(0,80))))
pt = st_point(c(30,70))
x = st_sfc(pole, pt, crs = 4326)
st_geod_distance(x, x)
```

lwgeom_extSoftVersion *Provide the external dependencies versions of the libraries linked to sf*

Description

Provide the external dependencies versions of the libraries linked to sf

Usage

```
lwgeom_extSoftVersion()
```

lwgeom_make_valid	<i>Make an invalid geometry valid</i>
-------------------	---------------------------------------

Description

Make an invalid geometry valid

Usage

```
lwgeom_make_valid(x)
```

Arguments

x	object of class sfc
---	---------------------

perimeter	<i>compute perimeter from polygons or other geometries</i>
-----------	--

Description

compute perimeter from polygons or other geometries

Usage

```
st_perimeter(x)
```

```
st_perimeter_2d(x)
```

Arguments

x	object of class sf, sfc or sfg
---	--------------------------------

Value

numerical vector with perimeter for each feature (geometry), with unit of measure when possible

st_astext	<i>Return Well-known Text representation of simple feature geometry</i>
-----------	---

Description

Return Well-known Text representation of simple feature geometry or coordinate reference system

Usage

```
st_astext(x, digits = options("digits"), ..., EWKT = FALSE)
```

```
st_asewkt(x, digits = options("digits"))
```

Arguments

x	object of class sfg, sfc, or sf
digits	integer; number of decimal digits to print
...	ignored
EWKT	logical; use PostGIS Enhanced WKT (includes srid)

Details

The returned WKT representation of simple feature geometry conforms to the [simple features access](#) specification and extensions (if EWKT = TRUE), [known as EWKT](#), supported by PostGIS and other simple features implementations for addition of SRID to a WKT string.

st_asewkt() returns the Well-Known Text (WKT) representation of the geometry with SRID meta data.

Examples

```
library(sf)
pt <- st_sfc(st_point(c(1.0002, 2.3030303)), crs = 4326)
st_astext(pt, 3)
st_asewkt(pt, 3)
```

st_as_sfc.TWKB	<i>create sfc object from tiny well-known binary (twkb)</i>
----------------	---

Description

create sfc object from tiny well-known binary (twkb)

Usage

```
## S3 method for class 'TWKB'
st_as_sfc(x, ...)
```

Arguments

x list with raw vectors, of class TWKB
 ... ignored

See Also

<https://github.com/TWKB/Specification/blob/master/twkb.md>

Examples

```
l = structure(list(as.raw(c(0x02, 0x00, 0x02, 0x02, 0x02, 0x08, 0x08))), class = "TWKB")
library(sf) # load generic
st_as_sf(l)
```

st_force_polygon_cw *Force a POLYGON or MULTIPOLYGON to be clockwise*

Description

Check if a POLYGON or MULTIPOLYGON is clockwise, and if not make it so. According to the 'Right-hand-rule', outer rings should be clockwise, and inner holes should be counter-clockwise

Usage

```
st_force_polygon_cw(x)
```

Arguments

x object with polygon geometries

Value

object of the same class as x

Examples

```
library(sf)
polys <- st_sf(cw = c(FALSE, TRUE),
               st_as_sf(c('POLYGON ((0 0, 1 0, 1 1, 0 0))',
                          'POLYGON ((1 1, 2 2, 2 1, 1 1))')))

st_force_polygon_cw(polys)
st_force_polygon_cw(st_geometry(polys))
st_force_polygon_cw(st_geometry(polys)[[1]])
```

st_geod_azimuth	<i>compute azimuth between sequence of points</i>
-----------------	---

Description

compute azimuth between sequence of points

Usage

```
st_geod_azimuth(x)
```

Arguments

x	object of class sf, sfc or sfg
---	--------------------------------

Examples

```
library(sf)
p = st_sfc(st_point(c(7,52)), st_point(c(8,53)), crs = 4326)
st_geod_azimuth(p)
```

st_geohash	<i>compute geohash from (average) coordinates</i>
------------	---

Description

compute geohash from (average) coordinates

Usage

```
st_geohash(x, precision = 0)
```

Arguments

x	object of class sf, sfc or sfg
precision	integer; precision (length) of geohash returned. From the liblwgeom source: “where the precision is non-positive, a precision based on the bounds of the feature. Big features have loose precision. Small features have tight precision.”

Details

see <http://geohash.org/> or <https://en.wikipedia.org/wiki/Geohash>.

Value

character vector with geohashes

Examples

```
library(sf)
lwgeom::st_geohash(st_sfc(st_point(c(1.5,3.5)), st_point(c(0,90))), 2)
lwgeom::st_geohash(st_sfc(st_point(c(1.5,3.5)), st_point(c(0,90))), 10)
```

st_is_polygon_cw	<i>Check if a POLYGON or MULTIPOLYGON is clockwise</i>
------------------	--

Description

Check if a POLYGON or MULTIPOLYGON is clockwise. According to the 'Right-hand-rule', outer rings should be clockwise, and inner holes should be counter-clockwise

Usage

```
st_is_polygon_cw(x)
```

Arguments

x object with polygon geometries

Value

logical with length the same number of features in 'x'

Examples

```
library(sf)
polys <- st_sf(cw = c(FALSE, TRUE),
               st_as_sfc(c('POLYGON ((0 0, 1 0, 1 1, 0 0))',
                           'POLYGON ((1 1, 2 2, 2 1, 1 1)'))))

st_is_polygon_cw(polys)
st_is_polygon_cw(st_geometry(polys))
st_is_polygon_cw(st_geometry(polys)[[1]])
```

st_linesubstring	<i>get substring from linestring</i>
------------------	--------------------------------------

Description

get substring from linestring

Usage

```
st_linesubstring(x, from, to, tolerance, ...)
```

Arguments

x	object of class sfc, sf or sfg
from	relative distance from origin (in [0,1])
to	relative distance from origin (in [0,1])
tolerance	tolerance parameter, when to snap to line node
...	ignored

Value

object of class sfc

Examples

```
library(sf)
lines = st_sfc(st_linestring(rbind(c(0,0), c(1,2), c(2,0))), crs = 4326)
spl = st_linesubstring(lines, 0.2, 0.8) # should warn
plot(st_geometry(lines), col = 'red', lwd = 3)
plot(spl, col = 'black', lwd = 3, add = TRUE)
st_linesubstring(lines, 0.49999, 0.8) # three points
st_linesubstring(lines, 0.49999, 0.8, 0.001) # two points: snap start to second node
```

st_snap_to_grid	<i>Snap geometries to a grid</i>
-----------------	----------------------------------

Description

Snap geometries to a grid

Usage

```
st_snap_to_grid(x, size, origin)
```

Arguments

x	object with geometries to be snapped
size	numeric or (length) units object; grid cell size in x-, y- (and possibly z- and m-) directions
origin	numeric; origin of the grid

Value

object of the same class as x

Examples

```
# obtain data
library(sf)
x = st_read(system.file("gpkg/nc.gpkg", package="sf"), quiet = TRUE)[1, ] %>%
  st_geometry %>%
  st_transform(3395)

# snap to a grid of 5000 m
err = try(y <- st_snap_to_grid(x, 5000))

# plot data for visual comparison
if (!inherits(err, "try-error")) {
  opar = par(mfrow = c(1, 2))
  plot(x, main = "original data")
  plot(y, main = "snapped to 5000 m")
  par(opar)
}
```

st_split

Return a collection of geometries resulting by splitting a geometry

Description

Return a collection of geometries resulting by splitting a geometry

Usage

```
st_split(x, y)
```

Arguments

x object with geometries to be splitted

y object split with (blade); if y contains more than one feature geometry, the geometries are [st_combine](#) 'd

Value

object of the same class as x

Examples

```
library(sf)
l = st_as_sfc('MULTILINESTRING((10 10, 190 190), (15 15, 30 30, 100 90))')
pt = st_sfc(st_point(c(30,30)))
st_split(l, pt)
```

st_startpoint	<i>Return the start and end points from lines</i>
---------------	---

Description

Return the start and end points from lines

Usage

```
st_startpoint(x)
```

```
st_endpoint(x)
```

Arguments

x line of class sf, sfc or sfg

Details

see https://postgis.net/docs/ST_StartPoint.html and https://postgis.net/docs/ST_EndPoint.html.

Value

sf object representing start and end points

Examples

```
library(sf)
m = matrix(c(0, 1, 2, 0, 1, 4), ncol = 2)
l = st_sfc(st_linestring(m))
lwgeom::st_startpoint(l)
lwgeom::st_endpoint(l)
l2 = st_sfc(st_linestring(m), st_linestring(m[3:1, ]))
lwgeom::st_startpoint(l2)
lwgeom::st_endpoint(l2)
```

st_subdivide	<i>Return a collection of geometries resulting by subdividing a geometry</i>
--------------	--

Description

Return a collection of geometries resulting by subdividing a geometry

Usage

```
st_subdivide(x, max_vertices)
```

Arguments

x object with geometries to be subdivided
max_vertices integer; maximum size of the subgeometries (at least 8)

Value

object of the same class as x

Examples

```
library(sf)
demo(nc, ask = FALSE, echo = FALSE)
x = st_subdivide(nc, 10)
plot(x[1])
```

st_transform_proj	<i>Transform or convert coordinates of simple features directly with Proj.4 (bypassing GDAL)</i>
-------------------	--

Description

Transform or convert coordinates of simple features directly with Proj.4 (bypassing GDAL)

Usage

```
st_transform_proj(x, crs, ...)

## S3 method for class 'sfc'
st_transform_proj(x, crs, ...)

## S3 method for class 'sf'
st_transform_proj(x, crs, ...)

## S3 method for class 'sfg'
st_transform_proj(x, crs, ...)
```

Arguments

x object of class sf, sfc or sfg
crs character; target CRS, or, in case of a length 2 character vector, source and target CRS
... ignored

Details

Transforms coordinates of object to new projection, using PROJ directly rather than the GDAL API used by `st_transform`.

If `crs` is a single CRS, it forms the target CRS, and in that case the source CRS is obtained as `st_crs(x)`. Since this presumes that the source CRS is accepted by GDAL (which is not always the case), a second option is to specify the source and target CRS as two proj4strings in argument `crs`. In the latter case, `st_crs(x)` is ignored and may well be NA.

The `st_transform_proj` method for `sfg` objects assumes that the CRS of the object is available as an attribute of that name.

Examples

```
library(sf)
p1 = st_point(c(7,52))
p2 = st_point(c(-30,20))
sfc = st_sfc(p1, p2, crs = 4326)
sfc
st_transform_proj(sfc, "+proj=wintri")
library(sf)
nc = st_read(system.file("shape/nc.shp", package="sf"))
st_transform_proj(nc[1,], "+proj=wintri +over")
st_transform_proj(structure(p1, proj4string = "+init=epsg:4326"), "+init=epsg:3857")
```

st_wrap_x	<i>Splits input geometries by a vertical line and moves components falling on one side of that line by a fixed amount</i>
-----------	---

Description

Splits input geometries by a vertical line and moves components falling on one side of that line by a fixed amount

Usage

```
st_wrap_x(x, wrap, move)
```

Arguments

x	object with geometries to be split
wrap	x value of split line
move	amount by which geometries falling to the left of the line should be translated to the right

Value

object of the same class as x

Examples

```
library(sf)
demo(nc, ask = FALSE, echo = FALSE)
x = st_wrap_x(nc, -78, 10)
plot(x[1])
```

Index

bounding_circle, 2

geod, 3

lwgeom_extSoftVersion, 4, 4

lwgeom_make_valid, 5

perimeter, 5

st_as_sfc.TWKB, 6

st_asewkt (st_astext), 6

st_astext, 6

st_combine, 11

st_distance, 4

st_endpoint (st_startpoint), 12

st_force_polygon_cw, 7

st_geod_area (geod), 3

st_geod_azimuth, 8

st_geod_covered_by (geod), 3

st_geod_covers (geod), 3

st_geod_distance (geod), 3

st_geod_length (geod), 3

st_geod_segmentize (geod), 3

st_geohash, 8

st_is_polygon_cw, 9

st_linesubstring, 9

st_minimum_bounding_circle
(bounding_circle), 2

st_perimeter (perimeter), 5

st_perimeter_2d (perimeter), 5

st_snap_to_grid, 10

st_split, 11

st_startpoint, 12

st_subdivide, 12

st_transform, 14

st_transform_proj, 13

st_wrap_x, 14