

Package ‘cartography’

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Title Thematic Cartography

Version 3.0.0

Description Create and integrate maps in your R workflow. This package helps to design cartographic representations such as proportional symbols, choropleth, typology, flows or discontinuities maps. It also offers several features that improve the graphic presentation of maps, for instance, map palettes, layout elements (scale, north arrow, title...), labels or legends. See Giraud and Lambert (2017) <doi:10.1007/978-3-319-57336-6_13>.

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URL <https://github.com/riatelab/cartography/>

BugReports <https://github.com/riatelab/cartography/issues/>

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R topics documented:

barscale	3
carto.pal	4
choroLayer	5
discLayer	8
dotDensityLayer	10
getBorders	12
getBreaks	13
getFigDim	15
getGridLayer	16
getLinkLayer	17
getPencilLayer	18
getPngLayer	19
getTiles	21
ghostLayer	23
gradLinkLayer	24
gradLinkTypoLayer	25
hatchedLayer	28
labelLayer	29
layoutLayer	31
legendBarsSymbols	32
legendChoro	34
legendCirclesSymbols	35
legendGradLines	37
legendHatched	38
legendPropLines	39
legendPropTriangles	41
legendSquaresSymbols	42
legendTypo	43
legendWaffle	45
north	46
propLinkLayer	47
propSymbolsChoroLayer	48
propSymbolsLayer	51
propSymbolsTypoLayer	53
propTrianglesLayer	56
smoothLayer	58
tilesLayer	60
typoLayer	61
waffleLayer	63
wordcloudLayer	65

barscale	<i>Scale Bar</i>
----------	------------------

Description

Plot a scale bar.

Usage

```
barscale(  
  size,  
  lwd = 1.5,  
  cex = 0.6,  
  pos = "bottomright",  
  style = "pretty",  
  unit = "km"  
)
```

Arguments

size	size of the scale bar in units (default to km). If size is not set, an automatic size is used (1/10 of the map width).
lwd	width of the scale bar.
cex	cex of the text.
pos	position of the legend, default to "bottomright". "bottomright" or a vector of two coordinates (c(x, y)) are possible.
style	style of the legend, either "pretty" or "oldschool". The "oldschool" style only uses the "size" parameter.
unit	units used for the scale bar. Can be "mi" for miles, "m" for meters, or "km" for kilometers (default)

Note

This scale bar is not accurate on unprojected (long/lat) maps.

See Also

[layoutLayer](#)

Examples

```
library(sf)  
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))  
plot(st_geometry(mtq), col = "grey60", border = "grey20")  
barscale(size = 5)  
barscale(size = 5, lwd = 2, cex = .9, pos = c(714000, 1596000))
```

`carto.pal`*Build Cartographic Palettes*

Description

`carto.pal` builds sequential, diverging and qualitative color palettes. Diverging color palettes can be dissymmetric (different number of colors in each of the two gradients).

`carto.pal.info` displays the names of all color palettes.

`display.carto.pal` displays one color palette.

`display.carto.all` displays all the available color palettes.

Usage

```
carto.pal(  
  pal1,  
  n1,  
  pal2 = NULL,  
  n2 = NULL,  
  middle = FALSE,  
  transparency = FALSE  
)
```

```
carto.pal.info()
```

```
display.carto.pal(name)
```

```
display.carto.all(n = 10)
```

Arguments

<code>pal1</code>	name of the color gradient (see Details).
<code>n1</code>	number of colors (up to 20).
<code>pal2</code>	name of the color gradient (see Details).
<code>n2</code>	number of colors (up to 20).
<code>middle</code>	a logical value. If TRUE, a neutral color ("#F6F6F6", light grey) between two gradients is added.
<code>transparency</code>	a logical value. If TRUE, contrasts are enhanced by adding an opacity variation.
<code>name</code>	name of the palette available in the package (see Details).
<code>n</code>	number of colors in the gradient (up to 20).

Details

Sequential palettes: "blue.pal", "orange.pal", "red.pal", "brown.pal", "green.pal", "purple.pal", "pink.pal", "wine.pal", "grey.pal", "turquoise.pal", "sand.pal", "taupe.pal", "kaki.pal" or "harmony.pal".

Qualitative palettes: "pastel.pal" or "multi.pal".

Value

`carto.pal` returns a vector of colors.

`carto.pal.info` returns a vector of color palettes names.

References

Qualitative palettes were generated with "i want hue" (<https://medialab.github.io/iwanthue/>) by Mathieu Jacomy at the Sciences-Po Medialab.

Examples

```
# Simple gradient: blue
carto.pal(pal1 = "blue.pal" ,n1 = 20)

# Double gradient: blue & red
carto.pal(pal1 = "blue.pal", n1 = 10, pal2 = "red.pal", n2 = 10)

# Adding a neutral color
carto.pal(pal1 = "blue.pal", n1 = 10, pal2 = "red.pal", n2 = 10, middle = TRUE)

# Enhancing contrasts with transparency
carto.pal(pal1="blue.pal", n1 = 10, pal2 = "red.pal", n2 = 10, middle = TRUE,
          transparency = TRUE)

# The double gradient can be asymmetric
carto.pal(pal1 = "blue.pal", n1 = 5, pal2 = "red.pal", n2 = 15, middle = TRUE,
          transparency = TRUE)

# Build and display a palette
mypal <- carto.pal(pal1 = "blue.pal", n1 = 5, pal2 = "red.pal", n2 = 15,
                  middle = TRUE, transparency = TRUE)
k <- length(mypal)
image(1:k, 1, as.matrix(1:k), col =mypal, xlab = paste(k," classes",sep=""),
      ylab = "", xaxt = "n", yaxt = "n",bty = "n")
carto.pal.info()
display.carto.pal("orange.pal")
display.carto.all(8)
```

choroLayer

Choropleth Layer

Description

Plot a choropleth layer.

Usage

```
choroLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  breaks = NULL,
  method = "quantile",
  nclass = NULL,
  col = NULL,
  border = "grey20",
  lwd = 1,
  colNA = "white",
  legend.pos = "bottomleft",
  legend.title.txt = var,
  legend.title.cex = 0.8,
  legend.values.cex = 0.6,
  legend.values.rnd = 0,
  legend.nodata = "no data",
  legend.frame = FALSE,
  legend.border = "black",
  legend.horiz = FALSE,
  add = FALSE
)
```

Arguments

x	an sf object, a simple feature collection. If x is used then spdf, df, spdfid and dfid are not.
spdf	a SpatialPolygonsDataFrame.
df	a data frame that contains the values to plot. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var	name of the numeric variable to plot.
breaks	break values in sorted order to indicate the intervals for assigning the colors. Note that if there are nlevel colors (classes) there should be (nlevel+1) break values (see Details).
method	a classification method; one of "sd", "equal", "quantile", "fisher-jenks", "q6", "geom", "arith", "em" or "msd" (see getBreaks).
nclass	a targeted number of classes. If null, the number of class is automatically defined (see Details).

col	a vector of colors. Note that if breaks is specified there must be one less colors specified than the number of break.
border	color of the polygons borders.
lwd	borders width.
colNA	no data color.
legend.pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If legend.pos is "n" then the legend is not plotted.
legend.title.txt	title of the legend.
legend.title.cex	size of the legend title.
legend.values.cex	size of the values in the legend.
legend.values.rnd	number of decimal places of the values in the legend.
legend.nodata	no data label.
legend.frame	whether to add a frame to the legend (TRUE) or not (FALSE).
legend.border	color of boxes borders in the legend.
legend.horiz	whether to display the legend horizontally (TRUE) or not (FALSE).
add	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Details

The optimum number of class depends on the number of geographical objects. If nclass is not defined, an automatic method inspired by Sturges (1926) is used : $n_{class} = 1 + 3.3 * \log_{10}(N)$, where nclass is the number of class and N is the variable length.

If breaks is used then nclass and method are not.

If breaks is defined as c(2, 5, 10, 15, 20) intervals will be: [2 - 5[, [5 - 10[, [10 - 15[, [15 - 20].

References

Herbert A. Sturges, « *The Choice of a Class Interval* », Journal of the American Statistical Association, vol. 21, n° 153, mars 1926, p. 65-66.

See Also

[getBreaks](#), [carto.pal](#), [legendChoro](#), [propSymbolsChoroLayer](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Population density
mtq$POPDENS <- 1e6 * mtq$POP / st_area(x = mtq)

# Default
choroLayer(x = mtq, var = "POPDENS")

# With parameters
choroLayer(x = mtq, var = "POPDENS",
           method = "quantile", nclass = 5,
           col = carto.pal(pal1 = "sand.pal", n1 = 5),
           border = "grey40",
           legend.pos = "topright", legend.values.rnd = 0,
           legend.title.txt = "Population Density\n(people per km2)")

# Layout
layoutLayer(title = "Population Distribution in Martinique, 2015")

```

discLayer

Discontinuities Layer

Description

This function computes and plots spatial discontinuities. The discontinuities are plotted over the layer outputted by the [getBorders](#) function. The line widths reflect the ratio or the difference between values of an indicator in two neighbouring units.

Usage

```

discLayer(
  x,
  df,
  dfid = NULL,
  var,
  method = "quantile",
  nclass = 4,
  threshold = 0.75,
  type = "rel",
  sizemin = 1,
  sizemax = 10,
  col = "red",
  legend.pos = "bottomleft",
  legend.title.txt = "legend title",
  legend.title.cex = 0.8,
  legend.values.cex = 0.6,
  legend.values.rnd = 2,

```



```

    legend.frame = FALSE,
    add = TRUE
  )

```

Arguments

x	an sf object, a simple feature collection, as outputted by the getBorders function.
df	a data frame that contains the values used to compute and plot discontinuities.
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var	name of the numeric variable used to compute and plot discontinuities.
method	a classification method; one of "sd", "equal", "quantile", "fisher-jenks", "q6", "geom", "arith", "em" or "msd" (see getBreaks).
nclass	a targeted number of classes. If null, the number of class is automatically defined (see getBreaks).
threshold	share of represented borders, value between 0 (nothing) and 1 (all the discontinuities).
type	type of discontinuity measure, one of "rel" or "abs" (see Details).
sizemin	thickness of the smallest line.
sizemax	thickness of the biggest line.
col	color of the discontinuities lines.
legend.pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If legend.pos is "n" then the legend is not plotted.
legend.title.txt	title of the legend.
legend.title.cex	size of the legend title.
legend.values.cex	size of the values in the legend.
legend.values.rnd	number of decimal places of the values in the legend.
legend.frame	whether to add a frame to the legend (TRUE) or not (FALSE).
add	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Details

The "rel" type of discontinuity is the result of $\text{pmax}(\text{value unit 1} / \text{value unit 2}, \text{value unit 2} / \text{value unit 1})$.

The "abs" type of discontinuity is the result of $\text{pmax}(\text{value unit 1} - \text{value unit 2}, \text{value unit 2} - \text{value unit 1})$.

Value

An [invisible](#) sf object (MULTISTRING) with the discontinuity measures is returned.

See Also

[getBorders](#), [gradLinkLayer](#), [legendGradLines](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Get borders
mtq.borders <- getBorders(x = mtq)
# Median Income
choroLayer(x = mtq, var = "MED", border = "grey", lwd = 0.5,
           method = 'equal', nclass = 6, legend.pos = "topleft",
           legend.title.txt = "Median Income\n(in euros)" )
# Discontinuities
disclayer(x = mtq.borders, df = mtq,
          var = "MED", col="red4", nclass=3,
          method="equal", threshold = 0.4, sizemin = 0.5,
          sizemax = 10, type = "abs", legend.values.rnd = 0,
          legend.title.txt = "Discontinuities\n(absolute difference)",
          legend.pos = "bottomleft", add=TRUE)
```

dotDensityLayer

Dot Density Layer

Description

Plot a dot density layer.

Usage

```
dotDensityLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  n = NULL,
  pch = 1,
  cex = 0.15,
  type = "random",
  col = "black",
  legend.pos = "topright",
  legend.txt = NULL,
  legend.cex = 0.6,
  legend.col = "black",
  legend.frame = TRUE,
  add = TRUE,
```

```
  iter
)
```

Arguments

x	an sf object, a simple feature collection. If x is used then spdf, df, spdfid and dfid are not.
spdf	a SpatialPolygonsDataFrame.
df	a data frame that contains the values to plot. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var	name of the numeric variable to plot.
n	one dot on the map represents n (in var units).
pch	symbol to use: points .
cex	size of the symbols
type	points allocation method: "random" or "regular" (see Details).
col	color of the points.
legend.pos	"topright", "left", "right", "bottomleft", "bottom", "bottomright". If legend.pos is "n" then the legend is not plotted.
legend.txt	text in the legend.
legend.cex	size of the legend text.
legend.col	color of the text in the legend.
legend.frame	whether to add a frame to the legend (TRUE) or not (FALSE).
add	whether to add the layer to an existing plot (TRUE) or not (FALSE).
iter	defunct.

Details

The type parameters is defined within the [st_sample](#) function.

See Also

[propSymbolsLayer](#)

Examples

```
## Not run:
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq), col = "#B8704D50")
dotDensityLayer(x = mtq, var="POP", pch=20, col = "red4", n = 200)
layoutLayer(title = "Population Distribution in Martinique, 2015")

## End(Not run)
```

`getBorders`*Extract Polygons Borders*

Description

Extract borders between polygons.

Outer borders are non-contiguous polygons borders (e.g. maritime borders).

Usage

```
getBorders(x, id, spdf, spdfid)
```

```
getOuterBorders(x, id, res = NULL, width = NULL, spdf, spdfid)
```

Arguments

<code>x</code>	an sf object, a simple feature collection or a SpatialPolygonsDataFrame.
<code>id</code>	name of the identifier variable in x, default to the first column. (optional)
<code>spdf</code>	defunct.
<code>spdfid</code>	defunct.
<code>res</code>	resolution of the grid used to compute outer borders (in x units). A high resolution will give more detailed borders. (optional)
<code>width</code>	maximum distance between used to compute outer borders (in x units). A higher width will build borders between units that are farther apart. (optional)

Value

An sf object (MULTILINESTRING) of borders is returned. This object has three id variables: `id`, `id1` and `id2`. `id1` and `id2` are ids of units that neighbour a border; `id` is the concatenation of `id1` and `id2` (with "_" as separator).

Note

`getBorders` and `getOuterBorders` can be combined with `rbind`.

See Also

[discLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Get borders
mtq.borders <- getBorders(x = mtq)
# Plot polygons
```

```

plot(st_geometry(mtg), border = NA, col = "grey60")
# Plot borders
plot(st_geometry(mtg.borders),
     col = sample(x = rainbow(nrow(mtg.borders))),
     lwd = 3, add = TRUE)
library(sf)
mtg <- st_read(system.file("gpkg/mtg.gpkg", package="cartography"))
# Get units borders
mtg.outer <- getOuterBorders(x = mtg, res = 1000, width = 2500)
# Plot municipalities
plot(st_geometry(mtg), col = "grey60")
# Plot borders
plot(st_geometry(mtg.outer), col = sample(x = rainbow(nrow(mtg.outer))),
     lwd = 3, add = TRUE)

```

getBreaks

Classification

Description

A function to classify continuous variables.

Usage

```
getBreaks(v, nclass = NULL, method = "quantile", k = 1, middle = FALSE, ...)
```

Arguments

v	a vector of numeric values.
nclass	a number of classes
method	a classification method; one of "fixed", "sd", "equal", "pretty", "quantile", "kmeans", "hclust", "bclust", "fisher", "jenks", "dpih", "q6", "geom", "arith", "em" or "msd" (see Details).
k	number of standard deviation for "msd" method (see Details)..
middle	creation of a central class for "msd" method (see Details).
...	further arguments of classIntervals .

Details

"fixed", "sd", "equal", "pretty", "quantile", "kmeans", "hclust", "bclust", "fisher", "jenks" and "dpih" are [classIntervals](#) methods. You may need to pass additional arguments for some of them.

Jenks ("jenks" method) and Fisher-Jenks ("fisher" method) algorithms are based on the same principle and give quite similar results but Fisher-Jenks is much faster.

The "q6" method uses the following [quantile](#) probabilities: 0, 0.05, 0.275, 0.5, 0.725, 0.95, 1.

The "geom" method is based on a geometric progression along the variable values.

The "arith" method is based on an arithmetic progression along the variable values.

The "em" method is based on nested averages computation.

The "msd" method is based on the mean and the standard deviation of a numeric vector. The nclass parameter is not relevant, use k and middle instead. k indicates the extent of each class in share of standard deviation. If middle=TRUE then the mean value is the center of a class else the mean is a break value.

Value

A numeric vector of breaks

Note

This function is mainly a wrapper of `classIntervals` + "arith", "em", "q6", "geom" and "msd" methods.

See Also

[classIntervals](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
var <- mtq$MED
# Histogram
hist(var, probability = TRUE, breaks = 20)
rug(var)
moy <- mean(var)
med <- median(var)
abline(v = moy, col = "red", lwd = 3)
abline(v = med, col = "blue", lwd = 3)

# Quantile intervals
breaks <- getBreaks(v = var, nclass = 6, method = "quantile")
hist(var, probability = TRUE, breaks = breaks, col = "#F0D9F9")
rug(var)
med <- median(var)
abline(v = med, col = "blue", lwd = 3)

# Pretty breaks
breaks <- getBreaks(v = var, nclass = 4, method = "pretty")
hist(var, probability = TRUE, breaks = breaks, col = "#F0D9F9", axes = FALSE)
rug(var)
axis(1, at = breaks)
axis(2)
abline(v = med, col = "blue", lwd = 6)
```

```

# kmeans method
breaks <- getBreaks(v = var, nclass = 4, method = "kmeans")
hist(var, probability = TRUE, breaks = breaks, col = "#F0D9F9")
rug(var)
abline(v = med, col = "blue", lwd = 6)

# Geometric intervals
breaks <- getBreaks(v = var, nclass = 8, method = "geom")
hist(var, probability = TRUE, breaks = breaks, col = "#F0D9F9")
rug(var)

# Mean and standard deviation (msd)
breaks <- getBreaks(v = var, method = "msd", k = 1, middle = TRUE)
hist(var, probability = TRUE, breaks = breaks, col = "#F0D9F9")
rug(var)
moy <- mean(var)
sd <- sd(var)
abline(v = moy, col = "red", lwd = 3)
abline(v = moy + 0.5 * sd, col = "blue", lwd = 3)
abline(v = moy - 0.5 * sd, col = "blue", lwd = 3)

```

getFigDim

Get Figure Dimensions

Description

Give the dimension of a map figure to be exported in raster or vector format.

Output dimension are based on a spatial object dimension ratio, margins of the figure, a targeted width or height and a resolution.

Usage

```
getFigDim(x, width = NULL, height = NULL, mar = par("mar"), res = 72, spdf)
```

Arguments

x	an sf object, a simple feature collection or a Spatial*DataFrame.
width	width of the figure (in pixels), either width or height must be set.
height	height of the figure (in pixels), either width or height must be set.
mar	a numerical vector of the form <code>c(bottom, left, top, right)</code> which gives the number of lines of margin to be specified on the four sides of the plot (see par).
res	the nominal resolution in ppi which will be recorded in the bitmap file.
spdf	defunct.

Details

The function can be used to export vector or raster files (see examples).

Value

A vector of width and height in pixels is returned.

Examples

```
## Not run:
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))

## PNG export
# get figure dimension
sizes <- getFigDim(x = mtq, width = 450, mar = c(0,0,1.2,0))
# export the map
png(filename = "mtq.png", width = sizes[1], height = sizes[2])
par(mar = c(0,0,1.2,0))
plot(st_geometry(mtq), col = "#D1914D", border = "white", bg = "#A6CAE0")
title("Madinina")
dev.off()

## PDF export
# get figure dimension
sizes <- getFigDim(x = mtq, width = 450, mar = c(1,1,2.2,1))
# export the map
pdf(file = "mtq.pdf", width = sizes[1]/72, height = sizes[2]/72)
par(mar = c(1,1,2.2,1))
plot(st_geometry(mtq), col = "#D1914D", border = "white", bg = "#A6CAE0")
title("Madinina")
dev.off()

## End(Not run)
```

getGridLayer

Build a Regular Grid Layer

Description

Build a regular grid based on an sf object or a SpatialPolygonsDataFrame.

Usage

```
getGridLayer(x, cellsize, type = "regular", var, spdf, spdfid)
```

Arguments

x	an sf object, a simple feature collection or a SpatialPolygonsDataFrame.
cellsize	targeted area of the cell, in map units.
type	shape of the cell, "regular" for squares, "hexagonal" for hexagons.
var	name of the numeric variable(s) in x to adapt to the grid (a vector).


```
spdf          defunct.
spdfid        defunct.
```

Value

A grid is returned as an sf object.

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Plot density of population
mtq$POPDENS <- 1e6 * mtq$POP / st_area(mtq)
bks <- getBreaks(v = mtq$POPDENS, method = "geom", 5)
cols <- carto.pal(pal1 = "taupe.pal", n1 = 5)
opar <- par(mfrow = c(1,2), mar = c(0,0,0,0))
choroLayer(x = mtq, var = "POPDENS", breaks = bks,
           border = "burlywood3", col = cols,
           legend.pos = "topright", legend.values.rnd = 0,
           legend.title.txt = "Population density")

mygrid <- getGridLayer(x = mtq, cellsize = 3e7,
                     type = "hexagonal", var = "POP")
## conversion from square meter to square kilometers
mygrid$POPDENSG <- 1e6 * mygrid$POP / mygrid$gridarea
choroLayer(x = mygrid, var = "POPDENSG", breaks = bks,
           border = "burlywood3", col = cols,
           legend.pos = "n", legend.values.rnd = 1,
           legend.title.txt = "Population density")

par(opar)
```

getLinkLayer

Create a Links Layer from a Data Frame of Links.

Description

Create a links layer from a data frame of links.

Usage

```
getLinkLayer(x, xid = NULL, df, dfid = NULL)
```

Arguments

x	an sf object, a simple feature collection (or a Spatial*DataFrame).
xid	name of the identifier variable in x, default to the first column (optional)
df	a data frame that contains identifiers of starting and ending points.
dfid	names of the identifier variables in df, character vector of length 2, default to the two first columns. (optional)

Value

An sf LINESTRING is returned, it contains two variables (origins and destinations).

See Also

[gradLinkLayer](#), [propLinkLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
mob <- read.csv(system.file("csv/mob.csv", package="cartography"))
# Select links from Fort-de-France (97209)
mob_97209 <- mob[mob$i == 97209, ]
# Create a link layer
mob.sf <- getLinkLayer(x = mtq, df = mob_97209, dfid = c("i", "j"))
# Plot the links1
plot(st_geometry(mtq), col = "grey")
plot(st_geometry(mob.sf), col = "red4", lwd = 2, add = TRUE)
```

getPencilLayer

Pencil Layer

Description

Create a pencil layer. This function transforms a POLYGON or MULTIPOLYGON sf object into a MULTILINESTRING one.

Usage

```
getPencilLayer(x, size = 100, buffer = 1000, lefthanded = TRUE)
```

Arguments

x	an sf object, a simple feature collection (POLYGON or MULTIPOLYGON).
size	density of the penciling. Median number of points used to build the MULTILINESTRING.
buffer	buffer around each polygon. This buffer (in map units) is used to take sample points. A negative value adds a margin between the penciling and the original polygons borders
lefthanded	if TRUE the penciling is done left-handed style.

Value

A MULTILINESTRING sf object is returned.

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
mtq_pencil <- getPencilLayer(x = mtq)
plot(st_geometry(mtq_pencil), col = 1:8)
plot(st_geometry(mtq), add = TRUE)

typoLayer(x = mtq_pencil, var="STATUS",
          col = c("aquamarine4", "yellow3", "wheat"),
          legend.values.order = c("Prefecture",
                                  "Sub-prefecture",
                                  "Simple municipality"),
          legend.pos = "topright",
          legend.title.txt = "Status")
plot(st_geometry(mtq), add = TRUE, ldy=2)
layoutLayer(title = "Municipality Status")

```

getPngLayer	.png Layer
-------------	------------

Description

Get a RasterBrick from a .png image cut using the shape of a spatial object. The .png file could be either a local file or extracted from a given url.

Usage

```

getPngLayer(
  x,
  pngpath,
  align = "center",
  margin = 0,
  crop = FALSE,
  mask = TRUE,
  inverse = FALSE,
  dwmode = "curl",
  ...
)

```

Arguments

x	an sf object, a simple feature collection (POLYGON or MULTIPOLYGON) or a tile (see getTiles).
pngpath	local path or url of a .png file.
align	set how the .png file should be fitted within x. Possible values are 'left', 'right', 'top', 'bottom' or 'center'.

margin	inner margin, zooms out the .png over x. If 0 then .png is completely zoomed over x.
crop	TRUE if results should be cropped to the specified x extent.
mask	TRUE if the result should be masked to x.
inverse	logical. If FALSE, overlapped areas of x on pngpath are extracted, otherwise non-overlapping areas are returned. See mask .
dwmode	Set the download mode. It could be 'base' for download.file or 'curl' for curl_download .
...	additional arguments for downloading the file. See download.file or curl_download .

Details

The effect of `align` would differ depending of the aspect ratio of `x` and `pngpath`. To obtain a fitted tile from `pngpath` given that `x` is the tile to fit, set `margin = 0` , `crop = TRUE`.

Value

A RasterBrick object is returned.

Note

The accuracy of the final plot would depend on the quality of the .png file, the scale of `x` and the resolution setup of the graphic device. Exporting to `svg` is highly recommended.

Author(s)

dieghernan, <https://github.com/dieghernan/>

See Also

[pngLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"))
#Local file
dirpng <- system.file("img/LogoMartinique.png", package = "cartography")
mask <- getPngLayer(mtq, dirpng)

## Not run:
#Remote file
urlpng <- "https://i.imgur.com/gePiDvB.png"
masksea <- getPngLayer(mtq, urlpng, mode = "wb", inverse = TRUE)

## End(Not run)
```

getTiles

*Get Tiles from Open Map Servers***Description**

Get map tiles based on a spatial object extent. Maps can be fetched from various open map servers.

Usage

```
getTiles(
  x,
  type = "OpenStreetMap",
  zoom = NULL,
  crop = FALSE,
  verbose = FALSE,
  apikey = NA,
  cachedir = FALSE,
  forceDownload = FALSE,
  spdf
)
```

Arguments

x	an sf object, a simple feature collection or a Spatial*DataFrame.
type	the tile server from which to get the map. See Details for providers. For other sources use a list: type = list(src = "name of the source", q = "tiles address", sub = "subdomains", cit = "how to cite the tiles"). See Examples.
zoom	the zoom level. If null, it is determined automatically (see Details).
crop	TRUE if results should be cropped to the specified x extent, FALSE otherwise. If x is an sf object with one POINT, crop is set to FALSE.
verbose	if TRUE, tiles filepaths, zoom level and citation are displayed.
apikey	Needed for Thunderforest maps.
cachedir	name of a directory used to cache tiles. If TRUE, places a 'tile.cache' folder in the working directory. If FALSE, tiles are not cached.
forceDownload	if TRUE, cached tiles are downloaded again.
spdf	defunct.

Details

Zoom levels are described on the OpenStreetMap wiki: https://wiki.openstreetmap.org/wiki/Zoom_levels.

Full list of providers:

'OpenStreetMap' (or 'osm')

'Stamen' (or 'stamenbw')

'Esri'

'OpenStreetMap.DE'	'Stamen.Toner'	'Esri.WorldStreetMap'
'OpenStreetMap.France'	'Stamen.TonerBackground'	'Esri.DeLorme'
'OpenStreetMap.HOT' (or 'hotstyle')	'Stamen.TonerHybrid'	'Esri.WorldTopoMap'
	'Stamen.TonerLines'	'Esri.WorldImagery'
'OpenMapSurfer'	'Stamen.TonerLabels'	'Esri.WorldTerrain'
'OpenMapSurfer.Roads'	'Stamen.TonerLite'	'Esri.WorldShadedRelief'
'OpenMapSurfer.Hybrid'	'Stamen.Watercolor' (or 'stamenwatercolor')	'Esri.OceanBasemap'
'OpenMapSurfer.AdminBounds'	'Stamen.Terrain'	'Esri.NatGeoWorldMap'
'OpenMapSurfer.ElementsAtRisk'	'Stamen.TerrainBackground'	'Esri.WorldGrayCanvas'
	'Stamen.TerrainLabels'	
'CartoDB'		'Hydda'
'CartoDB.Positron' (or 'cartolight')	'Thunderforest'	'Hydda.Full'
'CartoDB.PositronNoLabels'	'Thunderforest.OpenCycleMap'	'Hydda.Base'
'CartoDB.PositronOnlyLabels'	'Thunderforest.Transport'	'Hydda.RoadsAndLabels'
'CartoDB.DarkMatter' (or 'cartodark')	'Thunderforest.TransportDark'	
'CartoDB.DarkMatterNoLabels'	'Thunderforest.SpinalMap'	'HikeBike' (or 'hikebike')
'CartoDB.DarkMatterOnlyLabels'	'Thunderforest.Landscape'	'HikeBike.HikeBike'
'CartoDB.Voyager'	'Thunderforest.Outdoors'	
'CartoDB.VoyagerNoLabels'	'Thunderforest.Pioneer'	'OpenTopoMap' (or 'opentopomap')
'CartoDB.VoyagerOnlyLabels'	'Thunderforest.MobileAtlas'	'Wikimedia'
'CartoDB.VoyagerLabelsUnder'	'Thunderforest.Neighbourhood'	'OpenStreetMap.MapnikBW' (or 'o

Value

A RasterBrick is returned.

References

<https://leaflet-extras.github.io/leaflet-providers/preview/>

See Also

[tilesLayer](#)

Examples

```
## Not run:
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Download the tiles, extent = Martinique
mtqOSM <- getTiles(x = mtq, type = "osm", crop = TRUE)
# Plot the tiles
tilesLayer(mtqOSM)
# Plot countries
plot(st_geometry(mtq), add=TRUE)
txt <- paste0("\u00A9 OpenStreetMap contributors.",
              " Tiles style under CC BY-SA, www.openstreetmap.org/copyright")
mtext(text = txt, side = 1, adj = 0, cex = 0.7, font = 3)
```

```

# Download esri tiles
fullserver = paste("https://server.arcgisonline.com/ArcGIS/rest/services",
                  "Specialty/DeLorme_World_Base_Map/MapServer",
                  "tile/{z}/{y}/{x}.jpg",
                  sep = "/"
                  )
typeosm <- list(
  src = 'esri',
  q = fullserver,
  sub = NA,
  cit = 'Tiles; Esri; Copyright: 2012 DeLorme'
)
mtqESRI <- getTiles(x = mtq, type = typeosm, crop = TRUE, verbose = T, zoom = 10)
# Plot the tiles
tilesLayer(mtqESRI)
txt <- typeosm$cit
mtext(text = txt, side = 1, adj = 0, cex = 0.6, font = 3)

## End(Not run)

```

ghostLayer

Plot a Ghost Layer

Description

Plot an invisible layer with the extent of a spatial object.

Usage

```
ghostLayer(x, bg)
```

Arguments

x an sf object, a simple feature collection or a Spatial*DataFrame.
bg background color.

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
target <- mtq[30,]
ghostLayer(target, bg = "lightblue")
plot(st_geometry(mtq), add = TRUE, col = "gold2")
plot(st_geometry(target), add = TRUE, col = "red")
# overly complicated label placement trick:
labelLayer(x = suppressWarnings(st_intersection(mtq, st_buffer(target, 2000))),
           txt = "LIBGEO", halo = TRUE, cex = .9, r = .14, font = 2,
           bg = "grey20", col = "white")

```

gradLinkLayer	<i>Graduated Links Layer</i>
---------------	------------------------------

Description

Plot a layer of graduated links. Links are plotted according to discrete classes of widths.

Usage

```
gradLinkLayer(
  x,
  df,
  xid = NULL,
  dfid = NULL,
  var,
  breaks = getBreaks(v = df[, var], nclass = 4, method = "quantile"),
  lwd = c(1, 2, 4, 6),
  col = "red",
  legend.pos = "bottomleft",
  legend.title.txt = var,
  legend.title.cex = 0.8,
  legend.values.cex = 0.6,
  legend.values.rnd = 0,
  legend.frame = FALSE,
  add = TRUE
)
```

Arguments

x	an sf object, a simple feature collection.
df	a data frame that contains identifiers of starting and ending points and a variable.
xid	names of the identifier variables in x, character vector of length 2, default to the 2 first columns. (optional)
dfid	names of the identifier variables in df, character vector of length 2, default to the two first columns. (optional)
var	name of the variable used to plot the links widths.
breaks	break values in sorted order to indicate the intervals for assigning the lines widths.
lwd	vector of widths (classes of widths).
col	color of the links.
legend.pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If legend.pos is "n" then the legend is not plotted.
legend.title.txt	title of the legend.

`legend.title.cex` size of the legend title.
`legend.values.cex` size of the values in the legend.
`legend.values.rnd` number of decimal places of the values displayed in the legend.
`legend.frame` whether to add a frame to the legend (TRUE) or not (FALSE).
`add` whether to add the layer to an existing plot (TRUE) or not (FALSE).

Note

Unlike most of cartography functions, identifiers fields are mandatory.

See Also

[getLinkLayer](#), [propLinkLayer](#), [legendGradLines](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
mob <- read.csv(system.file("csv/mob.csv", package="cartography"))
# Create a link layer - work mobilities to Fort-de-France (97209)
mob.sf <- getLinkLayer(x = mtq, df = mob[mob$j==97209,], dfid = c("i", "j"))
# Plot the links - Work mobility
plot(st_geometry(mtq), col = "grey60", border = "grey20")
gradLinkLayer(x = mob.sf, df = mob,
              legend.pos = "topright",
              var = "fij",
              breaks = c(109,500,1000,2000,4679),
              lwd = c(1,2,4,10),
              col = "#92000090", add = TRUE)
  
```

gradLinkTypoLayer

Graduated and Colored Links Layer

Description

Plot a layer of colored and graduated links. Links are plotted according to discrete classes of widths. Colors depend on a discrete variable of categories.

Usage

```

gradLinkTypoLayer(
  x,
  df,
  xid = NULL,
  dfid = NULL,
  ...
)
  
```

```

var,
breaks = getBreaks(v = df[, var], nclass = 4, method = "quantile"),
lwd = c(1, 2, 4, 6),
var2,
col = NULL,
colNA = "white",
legend.title.cex = 0.8,
legend.values.cex = 0.6,
legend.values.rnd = 0,
legend.var.pos = "bottomleft",
legend.var.title.txt = var,
legend.var.frame = FALSE,
legend.var2.pos = "topright",
legend.var2.title.txt = var2,
legend.var2.values.order = NULL,
legend.var2.nodata = "no data",
legend.var2.frame = FALSE,
add = TRUE
)

```

Arguments

<code>x</code>	an sf object, a simple feature collection.
<code>df</code>	a data frame that contains identifiers of starting and ending points and variables.
<code>xid</code>	names of the identifier variables in x, character vector of length 2, default to the 2 first columns. (optional)
<code>dfid</code>	names of the identifier variables in df, character vector of length 2, default to the two first columns. (optional)
<code>var</code>	name of the variable used to plot the links widths.
<code>breaks</code>	break values in sorted order to indicate the intervals for assigning the lines widths.
<code>lwd</code>	vector of widths (classes of widths).
<code>var2</code>	name of the variable used to plot the links colors.
<code>col</code>	color of the links.
<code>colNA</code>	no data color.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.values.rnd</code>	number of decimal places of the values in the legend.
<code>legend.var.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)).
<code>legend.var.title.txt</code>	title of the legend (numeric data).

`legend.var.frame`
 whether to add a frame to the legend (TRUE) or not (FALSE).

`legend.var2.pos`
 position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)).

`legend.var2.title.txt`
 title of the legend (factor data).

`legend.var2.values.order`
 values order in the legend, a character vector that matches var modalities. Colors will be affected following this order.

`legend.var2.nodata`
 text for "no data" values

`legend.var2.frame`
 whether to add a frame to the legend (TRUE) or not (FALSE).

`add`
 whether to add the layer to an existing plot (TRUE) or not (FALSE).

Note

Unlike most of cartography functions, identifiers variables are mandatory.

See Also

[getLinkLayer](#), [propLinkLayer](#), [legendGradLines](#), [gradLinkLayer](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
mob <- read.csv(system.file("csv/mob.csv", package="cartography"))
# Create a link layer - work mobilities to Fort-de-France (97209) and
# Le Lamentin (97213)
mob.sf <- getLinkLayer(x = mtq, df = mob[mob$j %in% c(97209, 97213),],
                      dfid = c("i", "j"))
# Plot the links - Work mobility
plot(st_geometry(mtq), col = "grey60",border = "grey20")
gradLinkTypoLayer(x = mob.sf, df = mob,
                  var = "fij",
                  breaks = c(109,500,1000,2000,4679),
                  lwd = c(1,2,4,10),
                  var2='j', add = TRUE)

```

hatchedLayer

*Hatched Layer***Description**

Plot a hatched layer with several different patterns. Suitable for b/w print maps.

Usage

```
hatchedLayer(x, pattern = "dot", density = 1, txt = "a", ...)
```

Arguments

x	an sf object, a simple feature collection. It should be either a POLYGON or a MULTIPOLYGON.
pattern	Desired pattern to use for hatching. Possible values are: <ul style="list-style-type: none"> • Dots: "dot", "text" • Lines "diamond", "grid", "hexagon", "horizontal", "vertical", "zigzag", "left2right", "r
density	of the grid. By default the function uses a grid with a minimum of 10 cells on the shortest dimension of the bounding box. Additionally, it is possible to pass a cellsize value that would feed the st_make_grid underlying function.
txt	for the "text" pattern, that should be a character.
...	Additional graphic parameters (see Details).

Details

Possible values are:

pattern	add	col	bg	cex	pch	lwd	lty
"dot"	x	x	x	x	x		
"text"	x	x		x			
Lines patterns	x	x				x	x

Value

When passing mode='sfc' an 'sf' object (either MULTILINESTRING or MULTIPOINT) is returned.

Author(s)

dieghernan, <https://github.com/dieghernan/>

See Also

[legendHatched](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"))
par(mar=c(1,1,1,1))
hatchedLayer(mtg, "dot")
title("dot")
plot(st_geometry(mtg), border = NA, col="grey80")
hatchedLayer(mtg, "text", txt = "Y", add=TRUE)
title("text")
hatchedLayer(mtg, "diamond", density = 0.5)
plot(st_union(st_geometry(mtg)), add = TRUE)
title("diamond")
hatchedLayer(mtg, "grid", lwd = 1.5)
title("grid")
hatchedLayer(mtg, "hexagon", col = "blue")
title("hexagon")
hatchedLayer(mtg, "horizontal", lty = 5)
title("horizontal")
hatchedLayer(mtg, "vertical")
title("vertical")
hatchedLayer(mtg, "left2right")
title("left2right")
hatchedLayer(mtg, "right2left")
title("right2left")
hatchedLayer(mtg, "zigzag", cellsize=5000)
title("zigzag")
hatchedLayer(mtg, "circle")
title("circle")
```

labelLayer

Label Layer

Description

Put labels on a map.

Usage

```
labelLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  txt,
  col = "black",
  cex = 0.7,
  overlap = TRUE,
  show.lines = TRUE,
```

```

halo = FALSE,
bg = "white",
r = 0.1,
...
)

```

Arguments

x	an sf object, a simple feature collection. spdf, df, dfid and spdfid are not used.
spdf	a SpatialPointsDataFrame or a SpatialPolygonsDataFrame; if spdf is a SpatialPolygonsDataFrame texts are plotted on centroids.
df	a data frame that contains the labels to plot. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
txt	labels variable.
col	labels color.
cex	labels cex.
overlap	if FALSE, labels are moved so they do not overlap.
show.lines	if TRUE, then lines are plotted between x,y and the word, for those words not covering their x,y coordinate
halo	If TRUE, then a 'halo' is printed around the text and additional arguments bg and r can be modified to set the color and width of the halo.
bg	halo color if halo is TRUE
r	width of the halo
...	further text arguments.

See Also

[layoutLayer](#)

Examples

```

library(sf)
opar <- par(mar = c(0,0,0,0))
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq), col = "darkseagreen3", border = "darkseagreen4",
      bg = "#A6CAE0")
labelLayer(x = mtq, txt = "LIBGEO", col= "black", cex = 0.7, font = 4,
           halo = TRUE, bg = "white", r = 0.1,
           overlap = FALSE, show.lines = FALSE)
par(opar)

```

layoutLayer	<i>Layout Layer</i>
-------------	---------------------

Description

Plot a layout layer.

Usage

```
layoutLayer(
  title = "Title of the map, year",
  sources = "",
  author = "",
  horiz = TRUE,
  col = "black",
  coltitle = "white",
  theme = NULL,
  bg = NULL,
  scale = "auto",
  posscale = "bottomright",
  frame = TRUE,
  north = FALSE,
  south = FALSE,
  extent = NULL,
  tabtitle = FALSE,
  postitle = "left"
)
```

Arguments

title	title of the map.
sources	sources of the map (or something else).
author	author of the map (or something else).
horiz	orientation of sources and author. TRUE for horizontal display on the bottom left corner, FALSE for vertical display on the bottom right corner.
col	color of the title box and frame border.
coltitle	color of the title.
theme	name of a cartographic palette (see carto.pal.info). col and coltitle are set according to the chosen palette.
bg	color of the frame background.
scale	size of the scale bar in kilometers. If set to FALSE, no scale bar is displayed, if set to "auto" an automatic size is used (1/10 of the map width).
posscale	position of the scale, can be "bottomright", "bottomleft" or a vector of two coordinates (c(x, y))

frame	whether displaying a frame (TRUE) or not (FALSE).
north	whether displaying a North arrow (TRUE) or not (FALSE).
south	whether displaying a South arrow (TRUE) or not (FALSE).
extent	sf object or Spatial*DataFrame; sets the extent of the frame to the one of a spatial object. (optional)
tabtitle	size of the title box either a full banner (FALSE) or a "tab" (TRUE).
postitle	position of the title, one of "left", "center", "right".

Details

If extent is not set, plot.new has to be called first.

The size of the title box in layoutLayer is fixed to 1.2 lines height.

See Also

[labelLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq), col = "#D1914D", border = "white", bg = "#A6CAE0")
# Layout plot
layoutLayer()

plot(st_geometry(mtq), col = "#D1914D", border = "white", bg = "#A6CAE0")
# Layout plot
layoutLayer(title = "Martinique",
            author = paste0("cartography ", packageVersion("cartography")),
            tabtitle = TRUE, scale = 5, north = TRUE, frame = FALSE,
            theme = "sand.pal")
```

legendBarsSymbols

Legend for Proportional Bars Maps

Description

Plot legend for proportional bars maps

Usage

```
legendBarsSymbols(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  cex = 1,
  border = "black",
```



```

    lwd = 1,
    values.cex = 0.6,
    var,
    inches,
    col = "red",
    frame = FALSE,
    values.rnd = 0,
    style = "c"
  )

```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
border	color of the borders.
lwd	width of the borders.
values.cex	size of the values in the legend.
var	vector of values (at least min and max).
inches	height of the higher bar.
col	color of symbols.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
values.rnd	number of decimal places of the values in the legend.
style	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()
legendBarsSymbols(pos = "topleft", title.txt = "Title of\nthe legend",
  title.cex = 0.8, values.cex = 0.6, cex = 1,
  var = c(min(mtq$POP), max(mtq$POP)),
  inches = 0.5,
  col = "purple",
  values.rnd=0, style = "e")

```

 legendChoro

Legend for Choropleth Maps

Description

Plot legend for choropleth maps.

Usage

```
legendChoro(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  values.cex = 0.6,
  breaks,
  col,
  cex = 1,
  values.rnd = 2,
  nodata = TRUE,
  nodata.txt = "No data",
  nodata.col = "white",
  frame = FALSE,
  symbol = "box",
  border = "black",
  horiz = FALSE
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
values.cex	size of the values in the legend.
breaks	break points in sorted order to indicate the intervals for assigning the colors. Note that if there are nlevel colors (classes) there should be (nlevel+1) break-points. It is possible to use a vector of characters.
col	a vector of colors.
cex	size of the legend. 2 means two times bigger.
values.rnd	number of decimal places of the values in the legend.
nodata	if TRUE a "no data" box or line is plotted.
nodata.txt	label for "no data" values.
nodata.col	color of "no data" values.

frame	whether to add a frame to the legend (TRUE) or not (FALSE).
symbol	type of symbol in the legend 'line' or 'box'
border	color of the box borders
horiz	layout of legend, TRUE for horizontal layout

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()
legendChoro(pos = "bottomleft", title.txt = "Title of the legend", title.cex = 0.8,
            values.cex = 0.6, breaks = c(1,2,3,4,10.27,15.2),
            col = carto.pal(pal1 = "orange.pal",n1 = 5), values.rnd =2,
            nodata = TRUE, nodata.txt = "No data available", frame = TRUE, symbol="box")
legendChoro(pos = "bottomright", title.txt = "Title of the legend", title.cex = 0.8,
            values.cex = 0.6, breaks = c(1,2,5,7,10,15.27),
            col = carto.pal(pal1 = "wine.pal",n1 = 5), values.rnd = 0,
            nodata = TRUE, nodata.txt = "NA",nodata.col = "black",
            frame = TRUE, symbol="line")
legendChoro(pos = "topright", title.txt = "Title of the legend", title.cex = 0.8,
            values.cex = 0.6,
            breaks = c(0,"two","100","1 000","10,000", "1 Million"),
            col = carto.pal(pal1 = "orange.pal",n1 = 5), values.rnd =2,
            nodata = TRUE, nodata.txt = "No data available", frame = TRUE,
            symbol="box")
```

legendCirclesSymbols *Legend for Proportional Circles Maps*

Description

Plot legend for proportional circles maps

Usage

```
legendCirclesSymbols(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  cex = 1,
  border = "black",
  lwd = 1,
  values.cex = 0.6,
  var,
  inches,
  col = "#E84923",
  frame = FALSE,
```

```

    values.rnd = 0,
    style = "c"
)

```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
border	color of the borders.
lwd	width of the borders.
values.cex	size of the values in the legend.
var	vector of values (at least min and max).
inches	radii of the biggest circle.
col	color of symbols.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
values.rnd	number of decimal places of the values in the legend.
style	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()

propSymbolsLayer(x = mtq, var = "POP",
                 inches = 0.2, legend.pos = "n")

legendCirclesSymbols(pos = "topleft", inches = 0.2,
                    var = c(min(mtq$POP), max(mtq$POP)))
legendCirclesSymbols(pos = "left",
                    var = c(min(mtq$POP), max(mtq$POP)),
                    inches = 0.2, style = "e")
legendCirclesSymbols(pos = "bottomleft",
                    var = c(600, 12000, 40000, max(mtq$POP)),
                    inches = 0.2, style = "c")
legendCirclesSymbols(pos = "topright", cex = 2,
                    var = c(600, 30000, max(mtq$POP)),
                    inches = 0.2, style = "e", frame = TRUE)
legendCirclesSymbols(pos = c(736164.4, 1596658),
                    var = c(min(mtq$POP), max(mtq$POP)),
                    inches = 0.2, frame = TRUE)

```

legendGradLines	<i>Legend for Graduated Size Lines Maps</i>
-----------------	---

Description

Plot legend for graduated size lines maps.

Usage

```
legendGradLines(  
  pos = "topleft",  
  title.txt = "Title of the legend",  
  title.cex = 0.8,  
  cex = 1,  
  values.cex = 0.6,  
  breaks,  
  lwd,  
  col,  
  values.rnd = 2,  
  frame = FALSE  
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
values.cex	size of the values in the legend.
breaks	break points in sorted order to indicate the intervals for assigning the width of the lines
lwd	a vector giving the width of the lines.
col	color of symbols.
values.rnd	number of decimal places of the values in the legend.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).

Examples

```
library(sf)  
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))  
plot(st_geometry(mtq))  
box()  
legendGradLines(title.txt = "Title of the legend",
```

```

pos = "topright",
title.cex = 0.8,
values.cex = 0.6, breaks = c(1,2,3,4,10.2,15.2),
lwd = c(0.2,2,4,5,10),
col = "blue", values.rnd = 2)

```

legendHatched

Legend for Hatched Maps

Description

Plot legend for hatched maps.

Usage

```

legendHatched(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  values.cex = 0.6,
  categ,
  patterns,
  ptrn.bg = "white",
  ptrn.text = "X",
  dot.cex = 0.5,
  text.cex = 0.5,
  cex = 1,
  frame = FALSE,
  ...
)

```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
values.cex	size of the values in the legend.
categ	vector of categories.
patterns	vector of patterns to be created for each element on categ, see hatchedLayer .
ptrn.bg	background of the legend box for each categ.
ptrn.text	text to be used for each categ="text", as a single value or a vector.
dot.cex	cex of each patterns = "dot" categories, as a single value or a vector.
text.cex	text size of each patterns = "text" categories, as a single value or a vector.

cex size of the legend. 2 means two times bigger.
 frame whether to add a frame to the legend (TRUE) or not (FALSE).
 ... optional graphical parameters, see details on [hatchedLayer](#)

Note

It is also possible to create solid legends, by setting `col` and `ptrn.bg` to the same color. Parameters would honour the order of the `categ` variable.

Author(s)

dieghernan, <https://github.com/dieghernan/>

See Also

[hatchedLayer](#), [legendTypo](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"))
typoLayer(mtg, var = "STATUS", legend.pos = "n",
           legend.values.order = c("Prefecture", "Sub-prefecture",
                                   "Simple municipality"),
           col = c("grey10", "grey50", "grey80"), border = NA)
mtq$Patts = cut(mtg$MED, c(-Inf, 15700, Inf), labels = FALSE)
hatchedLayer(mtg[mtq$Patts == 1, ], "left2right",
             density = 2, col = "white", add = TRUE, pch = 3, cex = 0.6)
hatchedLayer(mtg[mtq$Patts == 2, ], "left2right",
             density = 4, col = "white", add = TRUE)
legendHatched(pos = "bottomleft",
             cex = 1.5,
             values.cex = 0.8,
             title.txt = "Median Income\n(in thousand of euros)",
             categ = c("11.9 - 15.7", "14.7 - 21.8",
                       "Prefecture", "Sub-prefecture",
                       "Simple municipality"),
             patterns = c("left2right"), density = c(1, 2),
             col = c(rep("black", 2), "grey10", "grey50", "grey80"),
             ptrn.bg = c(rep("white", 2), "grey10", "grey50", "grey80"),
             pch = 3)
plot(st_geometry(st_union(mtg)), add = TRUE)

```

legendPropLines

Legend for Proportional Lines Maps

Description

Plot legend for proportional lines maps

Usage

```
legendPropLines(  
  pos = "topleft",  
  title.txt = "Title of the legend",  
  title.cex = 0.8,  
  cex = 1,  
  values.cex = 0.6,  
  var,  
  lwd,  
  col = "red",  
  frame = FALSE,  
  values.rnd = 0  
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
values.cex	size of the values in the legend.
var	vector of values (at least min and max).
lwd	width of the larger line.
col	color of symbols.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
values.rnd	number of decimal places of the values in the legend.

Examples

```
library(sf)  
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))  
plot(st_geometry(mtq))  
box()  
legendPropLines(pos = "topleft", title.txt = "Title",  
                title.cex = 0.8, values.cex = 0.6, cex = 1,  
                var = c(10,100),  
                lwd = 15,  
                col="red", frame=TRUE, values.rnd=0)
```

legendPropTriangles *Legend for Double Proportional Triangles Maps*

Description

Plot legends for double proportional triangles maps.

Usage

```
legendPropTriangles(  
  pos = "topleft",  
  title.txt,  
  var.txt,  
  var2.txt,  
  title.cex = 0.8,  
  cex = 1,  
  values.cex = 0.6,  
  var,  
  var2,  
  r,  
  r2,  
  col = "red",  
  col2 = "blue",  
  frame = FALSE,  
  values.rnd = 0,  
  style = "c"  
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
var.txt	name of var.
var2.txt	name of var2.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
values.cex	size of the values in the legend.
var	a first vector of positive values.
var2	a second vector of positive values.
r	a first vector of sizes.
r2	a second vector of sizes.
col	color of symbols.

col2	second color of symbols.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
values.rnd	number of decimal places of the values in the legend.
style	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()
var <- runif(10, 0,100)
var2 <- runif(10, 0,100)
r <- sqrt(var)*1000
r2 <- sqrt(var2)*1000
legendPropTriangles(pos = "topright", var.txt = "population 1",
                    var2.txt = "population 2", title.txt="Population totale",
                    title.cex = 0.8, values.cex = 0.6, cex = 1,
                    var = var, var2 = var2, r = r, r2 = r2,
                    col="green", col2="yellow", frame=TRUE, values.rnd=2,
                    style="c")
```

legendSquaresSymbols *Legend for Proportional Squares Maps*

Description

Plot legend for proportional squares maps

Usage

```
legendSquaresSymbols(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  cex = 1,
  border = "black",
  lwd = 1,
  values.cex = 0.6,
  var,
  inches,
  col = "red",
  frame = FALSE,
  values.rnd = 0,
  style = "c"
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
cex	size of the legend. 2 means two times bigger.
border	color of the borders.
lwd	width of the borders.
values.cex	size of the values in the legend.
var	vector of values (at least min and max).
inches	length of the sides of the larger square.
col	color of symbols.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
values.rnd	number of decimal places of the values in the legend.
style	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()
legendSquaresSymbols(pos = "bottomright", title.txt = "Title of\nthe legend ",
  title.cex = 0.8, values.cex = 0.6,
  var = c(max(mtq$POP), min(mtq$POP)),
  inches = 0.5,
  col="red",
  frame=TRUE, values.rnd=0, style ="c")
```

Description

Plot legend for typology maps.

Usage

```
legendTypo(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  values.cex = 0.6,
  col,
  categ,
  cex = 1,
  nodata = TRUE,
  nodata.txt = "No data",
  nodata.col = "white",
  frame = FALSE,
  symbol = "box"
)
```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
values.cex	size of the values in the legend.
col	a vector of colors.
categ	vector of categories.
cex	size of the legend. 2 means two times bigger.
nodata	if TRUE a "no data" box or line is plotted.
nodata.txt	label for "no data" values.
nodata.col	color of "no data" values.
frame	whether to add a frame to the legend (TRUE) or not (FALSE).
symbol	character; 'line' or 'box'

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()

# Define labels and colors
someLabels <- c("red color", "yellow color", "green color", "black color")
someColors <- c("red", "yellow", "green", "black")

# plot legend
legendTypo(pos = "bottomleft", title.txt = "Title of the legend", title.cex = 0.8,
```

```

values.cex = 0.6, col = someColors, categ = someLabels,
cex = 0.75,
nodata = TRUE, nodata.txt = "no data", frame = TRUE, symbol="box")
legendTypo(pos = "topright", title.txt = "",
title.cex = 1.5, cex = 1.25,
values.cex = 1, col = someColors, categ = someLabels,
nodata = FALSE, frame = FALSE, symbol="line")

```

legendWaffle

Legend for Typology Maps

Description

Plot legend for typology maps.

Usage

```

legendWaffle(
  pos = "topleft",
  title.txt = "Title of the legend",
  title.cex = 0.8,
  values.cex = 0.6,
  categ,
  cex = 1,
  cell.txt = "1 cell = ...",
  col,
  cell.size,
  border = "white",
  lwd = 0.2,
  frame = FALSE
)

```

Arguments

pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "bottomleftextra", "left" or a vector of two coordinates in map units (c(x, y)).
title.txt	title of the legend.
title.cex	size of the legend title.
values.cex	size of the values in the legend.
categ	vector of categories.
cex	size of the legend. 2 means two times bigger.
cell.txt	label for cell values.
col	a vector of colors.
cell.size	size of the cell

border	color of the cells borders.
lwd	width of the cells borders
frame	whether to add a frame to the legend (TRUE) or not (FALSE).

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()

# Define labels and colors
someLabels <- c("red color", "yellow color", "green color", "black color")
someColors <- c("red", "yellow", "green", "black")
legendWaffle(categ = someLabels, col = someColors, cell.size = 750)
```

north	<i>North Arrow</i>
-------	--------------------

Description

Plot a north arrow.

Usage

```
north(pos = "topright", col = "grey20", south = FALSE, x = NULL)
```

Arguments

pos	position of the north arrow. It can be one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)).
col	arrow color.
south	plot a south arrow instead.
x	sf or sp object used to correct the north azimuth

See Also

[layoutLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
box()
for (i in list("topleft", "top", "topright", "right", "bottomright",
              "bottom", "bottomleft", "left", c(746368, 1632993))){
  north(i, south = TRUE)
}
```

propLinkLayer *Proportional Links Layer*

Description

Plot a layer of proportional links. Links widths are directly proportional to values of a variable.

Usage

```
propLinkLayer(
  x,
  df,
  xid = NULL,
  dfid = NULL,
  var,
  maxlwd = 40,
  col,
  legend.pos = "bottomleft",
  legend.title.txt = var,
  legend.title.cex = 0.8,
  legend.values.cex = 0.6,
  legend.values.rnd = 0,
  legend.frame = FALSE,
  add = TRUE
)
```

Arguments

x	an sf object, a simple feature collection.
df	a data frame that contains identifiers of starting and ending points and a variable.
xid	names of the identifier variables in x, character vector of length 2, default to the 2 first columns. (optional)
dfid	names of the identifier variables in df, character vector of length 2, default to the two first columns. (optional)
var	name of the variable used to plot the links widths.
maxlwd	maximum size of the links.
col	color of the links.
legend.pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If legend.pos is "n" then the legend is not plotted.
legend.title.txt	title of the legend.
legend.title.cex	size of the legend title.

legend.values.cex	size of the values in the legend.
legend.values.rnd	number of decimal places of the values displayed in the legend.
legend.frame	whether to add a frame to the legend (TRUE) or not (FALSE).
add	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Note

Unlike most of cartography functions, identifiers variables are mandatory.

See Also

[gradLinkLayer](#), [getLinkLayer](#), [legendPropLines](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
mob <- read.csv(system.file("csv/mob.csv", package="cartography"))
# Create a link layer - work mobilities to Fort-de-France (97209)
mob.sf <- getLinkLayer(x = mtq, df = mob[mob$j==97209,], dfid = c("i", "j"))
# Plot the links - Work mobility
plot(st_geometry(mtq), col = "grey60", border = "grey20")
propLinkLayer(x = mob.sf, df = mob,
              maxlwd = 10,
              legend.pos = "topright",
              var = "fij",
              col = "#92000090", add = TRUE)
```

propSymbolsChoroLayer *Proportional and Choropleth Symbols Layer*

Description

Plot a proportional symbols layer with colors based on a quantitative data classification

Usage

```
propSymbolsChoroLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  inches = 0.3,
  fixmax = NULL,
```



```

symbols = "circle",
border = "grey20",
lwd = 1,
var2,
breaks = NULL,
method = "quantile",
nclass = NULL,
col = NULL,
colNA = "white",
legend.title.cex = 0.8,
legend.values.cex = 0.6,
legend.var.pos = "right",
legend.var.title.txt = var,
legend.var.values.rnd = 0,
legend.var.style = "c",
legend.var.frame = FALSE,
legend.var2.pos = "topright",
legend.var2.title.txt = var2,
legend.var2.values.rnd = 2,
legend.var2.nodata = "no data",
legend.var2.frame = FALSE,
legend.var2.border = "black",
legend.var2.horiz = FALSE,
add = TRUE
)

```

Arguments

x	an sf object, a simple feature collection. If x is used then spdf, df, spdfid and dfid are not.
spdf	SpatialPointsDataFrame or SpatialPolygonsDataFrame; if spdf is a SpatialPolygonsDataFrame symbols are plotted on centroids.
df	a data frame that contains the values to plot. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var	name of the numeric variable used to plot the symbols sizes.
inches	size of the biggest symbol (radius for circles, width for squares, height for bars) in inches.
fixmax	value of the biggest symbol (see propSymbolsLayer Details).
symbols	type of symbols, one of "circle", "square" or "bar".
border	color of symbols borders.
lwd	width of symbols borders.
var2	name of the numeric variable used to plot the symbols colors.

<code>breaks</code>	break points in sorted order to indicate the intervals for assigning the colors. Note that if there are <code>nlevel</code> colors (classes) there should be <code>(nlevel+1)</code> break-points (see choroLayer Details).
<code>method</code>	a classification method; one of "sd", "equal", "quantile", "fisher-jenks", "q6" or "geom" (see choroLayer Details).
<code>nclass</code>	a targeted number of classes. If null, the number of class is automatically defined (see choroLayer Details).
<code>col</code>	a vector of colors. Note that if <code>breaks</code> is specified there must be one less colors specified than the number of break.
<code>colNA</code>	no data color.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.var.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (<code>c(x, y)</code>). If <code>legend.var.pos</code> is "n" then the legend is not plotted.
<code>legend.var.title.txt</code>	title of the legend (proportional symbols).
<code>legend.var.values.rnd</code>	number of decimal places of the values in the legend.
<code>legend.var.style</code>	either "c" or "e". The legend has two display styles.
<code>legend.var.frame</code>	whether to add a frame to the legend (TRUE) or not (FALSE).
<code>legend.var2.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (<code>c(x, y)</code>). If <code>legend.var2.pos</code> is "n" then the legend is not plotted.
<code>legend.var2.title.txt</code>	title of the legend (colors).
<code>legend.var2.values.rnd</code>	number of decimal places of the values in the legend.
<code>legend.var2.nodata</code>	text for "no data" values
<code>legend.var2.frame</code>	whether to add a frame to the legend (TRUE) or not (FALSE).
<code>legend.var2.border</code>	color of boxes borders in the legend.
<code>legend.var2.horiz</code>	whether to display the legend horizontally (TRUE) or not (FALSE).
<code>add</code>	whether to add the layer to an existing plot (TRUE) or not (FALSE).

See Also

[legendBarsSymbols](#), [legendChoro](#), [legendCirclesSymbols](#), [legendSquaresSymbols](#), [choroLayer](#), [propSymbolsLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq), col = "grey60", border = "white",
      lwd=0.4, bg = "lightsteelblue1")
propSymbolsChoroLayer(x = mtq, var = "POP", var2 = "MED",
                      col = carto.pal(pal1 = "blue.pal", n1 = 3,
                                       pal2 = "red.pal", n2 = 3),
                      inches = 0.2, method = "q6",
                      border = "grey50", lwd = 1,
                      legend.var.pos = "topright",
                      legend.var2.pos = "left",
                      legend.var2.values.rnd = -2,
                      legend.var2.title.txt = "Median Income\n(in euros)",
                      legend.var.title.txt = "Total Population",
                      legend.var.style = "e")

# First layout
layoutLayer(title="Population and Wealth in Martinique, 2015")
```

propSymbolsLayer *Proportional Symbols Layer*

Description

Plot a proportional symbols layer.

Usage

```
propSymbolsLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  inches = 0.3,
  fixmax = NULL,
  symbols = "circle",
  col = "#E84923",
  border = "black",
  lwd = 1,
  legend.pos = "bottomleft",
  legend.title.txt = var,
```

```

    legend.title.cex = 0.8,
    legend.values.cex = 0.6,
    legend.values.rnd = 0,
    legend.style = "c",
    legend.frame = FALSE,
    add = TRUE
  )

```

Arguments

<code>x</code>	an sf object, a simple feature collection. If <code>x</code> is used then <code>spdf</code> , <code>df</code> , <code>spdfid</code> and <code>dfid</code> are not.
<code>spdf</code>	a <code>SpatialPointsDataFrame</code> or a <code>SpatialPolygonsDataFrame</code> ; if <code>spdf</code> is a <code>SpatialPolygonsDataFrame</code> symbols are plotted on centroids.
<code>df</code>	a data frame that contains the values to plot. If <code>df</code> is missing <code>spdf@data</code> is used instead.
<code>spdfid</code>	identifier field in <code>spdf</code> , default to the first column of the <code>spdf</code> data frame. (optional)
<code>dfid</code>	identifier field in <code>df</code> , default to the first column of <code>df</code> . (optional)
<code>var</code>	name of the numeric field in <code>df</code> to plot.
<code>inches</code>	size of the biggest symbol (radius for circles, width for squares, height for bars) in inches.
<code>fixmax</code>	value of the biggest symbol (see Details).
<code>symbols</code>	type of symbols, one of "circle", "square" or "bar".
<code>col</code>	color of symbols.
<code>border</code>	color of symbols borders.
<code>lwd</code>	width of symbols borders.
<code>legend.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (<code>c(x, y)</code>). If <code>legend.pos</code> is "n" then the legend is not plotted.
<code>legend.title.txt</code>	title of the legend.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.values.rnd</code>	number of decimal places of the values displayed in the legend.
<code>legend.style</code>	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.
<code>legend.frame</code>	boolean; whether to add a frame to the legend (TRUE) or not (FALSE).
<code>add</code>	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Details

Two maps with the same inches and fixmax parameters will be comparable.

See Also

[legendBarsSymbols](#), [legendCirclesSymbols](#), [legendSquaresSymbols](#), [propSymbolsChoroLayer](#), [propSymbolsTypoLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
plot(st_geometry(mtq))
propSymbolsLayer(x = mtq, var = "POP")

plot(st_geometry(mtq), col = "lightblue4", border = "lightblue3",
      bg = "lightblue1")
# Population plot on proportional symbols
propSymbolsLayer(x = mtq, var = "POP",
                 symbols = "circle", col = "white",
                 legend.pos = "right", border = "grey",
                 legend.title.txt = "Total\nPopulation",
                 legend.style = "c")

# Layout plot
layoutLayer(title = "Population Distribution in Martinique, 2015")
```

propSymbolsTypoLayer *Proportional Symbols Typo Layer*

Description

Plot a proportional symbols layer with colors based on qualitative data.

Usage

```
propSymbolsTypoLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  inches = 0.3,
  fixmax = NULL,
  symbols = "circle",
  border = "grey20",
  lwd = 1,
  var2,
```

```

col = NULL,
colNA = "white",
legend.title.cex = 0.8,
legend.values.cex = 0.6,
legend.var.pos = "bottomleft",
legend.var.title.txt = var,
legend.values.rnd = 0,
legend.var.style = "c",
legend.var.frame = FALSE,
legend.var2.pos = "topright",
legend.var2.title.txt = var2,
legend.var2.values.order = NULL,
legend.var2.nodata = "no data",
legend.var2.frame = FALSE,
add = TRUE
)

```

Arguments

<code>x</code>	an sf object, a simple feature collection. If <code>x</code> is used then <code>spdf</code> , <code>df</code> , <code>spdfid</code> and <code>dfid</code> are not.
<code>spdf</code>	<code>SpatialPointsDataFrame</code> or <code>SpatialPolygonsDataFrame</code> ; if <code>spdf</code> is a <code>SpatialPolygonsDataFrame</code> symbols are plotted on centroids.
<code>df</code>	a data frame that contains the values to plot. If <code>df</code> is missing <code>spdf@data</code> is used instead.
<code>spdfid</code>	name of the identifier variable in <code>spdf</code> , default to the first column of the <code>spdf</code> data frame. (optional)
<code>dfid</code>	name of the identifier variable in <code>df</code> , default to the first column of <code>df</code> . (optional)
<code>var</code>	name of the numeric variable used to plot the symbols sizes.
<code>inches</code>	size of the biggest symbol (radius for circles, width for squares, height for bars) in inches.
<code>fixmax</code>	value of the biggest symbol. (optional)
<code>symbols</code>	type of symbols, one of "circle", "square" or "bar".
<code>border</code>	color of symbols borders.
<code>lwd</code>	width of symbols borders.
<code>var2</code>	name of the factor (or character) variable used to plot the symbols colors.
<code>col</code>	a vector of colors.
<code>colNA</code>	no data color.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.var.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (<code>c(x, y)</code>).

`legend.var.title.txt`
 title of the legend (numeric data).

`legend.values.rnd`
 number of decimal places of the values in the legend.

`legend.var.style`
 either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.

`legend.var.frame`
 whether to add a frame to the legend (TRUE) or not (FALSE).

`legend.var2.pos`
 position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)).

`legend.var2.title.txt`
 title of the legend (factor data).

`legend.var2.values.order`
 values order in the legend, a character vector that matches var modalities. Colors will be affected following this order.

`legend.var2.nodata`
 text for "no data" values

`legend.var2.frame`
 whether to add a frame to the legend (TRUE) or not (FALSE).

`add`
 whether to add the layer to an existing plot (TRUE) or not (FALSE).

See Also

[legendBarsSymbols](#), [legendTypo](#), [legendCirclesSymbols](#), [legendSquaresSymbols](#), [typoLayer](#), [propSymbolsLayer](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Countries plot
plot(st_geometry(mtq), col = "lightblue4", border = "lightblue3",
     bg = "lightblue1")
# Population plot on proportional symbols
propSymbolsTypoLayer(x = mtq, var = "POP", var2 = "STATUS",
                    symbols = "circle",
                    col = c("aquamarine4", "yellow3", "wheat"),
                    legend.var2.values.order = c("Prefecture",
                                                  "Sub-prefecture",
                                                  "Simple municipality"),
                    legend.var.pos = "right", border = "grey",
                    legend.var.title.txt = "Total\nPopulation")
layoutLayer(title = "Population Distribution in Martinique, 2015")

```

propTrianglesLayer *Double Proportional Triangle Layer*

Description

Plot a double proportional triangles layer.

Usage

```
propTrianglesLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var1,
  col1 = "#E84923",
  var2,
  col2 = "#7DC437",
  k = 0.02,
  legend.pos = "topright",
  legend.title.txt = paste(var1, var2, sep = " / "),
  legend.title.cex = 0.8,
  legend.var1.txt = var1,
  legend.var2.txt = var2,
  legend.values.cex = 0.6,
  legend.values.rnd = 0,
  legend.style = "c",
  legend.frame = FALSE,
  add = TRUE
)
```

Arguments

x	an sf object, a simple feature collection. If x is used then spdf, df, spdfid and dfid are not.
spdf	a SpatialPointsDataFrame or a SpatialPolygonsDataFrame; if spdf is a SpatialPolygonsDataFrame symbols are plotted on centroids.
df	a data frame that contains the values to plot. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var1	name of the first numeric variable to plot, positive values only (top triangle).
col1	color of top triangles.

<code>var2</code>	name of the second numeric variable to plot, positive values only (bottom triangle).
<code>col2</code>	color of bottom triangles.
<code>k</code>	share of the map occupied by the biggest symbol.
<code>legend.pos</code>	position of the legend, one of "topleft", "top", "topright", "left", "right", "bottomleft", "bottom", "bottomright". If <code>legend.pos</code> is "n" then the legend is not plotted.
<code>legend.title.txt</code>	title of the legend.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.var1.txt</code>	label of the top variable.
<code>legend.var2.txt</code>	label of the bottom variable.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.values.rnd</code>	number of decimal places of the values displayed in the legend.
<code>legend.style</code>	either "c" or "e". The legend has two display styles, "c" stands for compact and "e" for extended.
<code>legend.frame</code>	boolean; whether to add a frame to the legend (TRUE) or not (FALSE).
<code>add</code>	whether to add the layer to an existing plot (TRUE) or not (FALSE).

See Also

[legendPropTriangles](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
# Employed Active Population
mtq$OCC <- mtq$ACT-mtq$CHOM
plot(st_geometry(mtq), col = "lightblue4",border = "lightblue3",
     bg = "lightblue1")
propTrianglesLayer(x = mtq, var1 = "OCC", var2 = "CHOM",
                  col1="green4",col2="red4",k = 0.1)
layoutLayer(title = "Active Population in Martinique, 2015")
```

`smoothLayer`*Smooth Layer*

Description

Plot a layer of smoothed data. It can also compute a ratio of potentials.

This function is a wrapper around the `quickStewart` function in `SpatialPosition` package.

The `SpatialPosition` package also provides:

- vignettes to explain the computation of potentials;
- more customizable inputs and outputs (custom distance matrix, raster output...);
- other functions related to spatial interactions (Reilly and Huff catchment areas).

Usage

```
smoothLayer(  
  x,  
  spdf,  
  df,  
  spdfid = NULL,  
  dfid = NULL,  
  var,  
  var2 = NULL,  
  typefct = "exponential",  
  span,  
  beta,  
  resolution = NULL,  
  mask = NULL,  
  nclass = 8,  
  breaks = NULL,  
  col = NULL,  
  border = "grey20",  
  lwd = 1,  
  legend.pos = "bottomleft",  
  legend.title.txt = "Potential",  
  legend.title.cex = 0.8,  
  legend.values.cex = 0.6,  
  legend.values.rnd = 0,  
  legend.frame = FALSE,  
  add = FALSE  
)
```

Arguments

`x` an sf object, a simple feature collection.

spdf	a SpatialPolygonsDataFrame.
df	a data frame that contains the values to compute. If df is missing spdf@data is used instead.
spdfid	name of the identifier variable in spdf, default to the first column of the spdf data frame. (optional)
dfid	name of the identifier variable in df, default to the first column of df. (optional)
var	name of the numeric variable used to compute potentials.
var2	name of the numeric variable used to compute potentials. This variable is used for ratio computation (see Details).
typefct	character; spatial interaction function. Options are "pareto" (means power law) or "exponential". If "pareto" the interaction is defined as: $(1 + \alpha * mDistance)^{-\beta}$. If "exponential" the interaction is defined as: $\exp(-\alpha * mDistance^{\beta})$. The alpha parameter is computed from parameters given by the user (beta and span).
span	numeric; distance where the density of probability of the spatial interaction function equals 0.5.
beta	numeric; impedance factor for the spatial interaction function.
resolution	numeric; resolution of the output SpatialPointsDataFrame (in map units).
mask	sf object or SpatialPolygonsDataFrame; mask used to clip contours of potentials.
nclass	numeric; a targeted number of classes (default to 8). Not used if breaks is set.
breaks	numeric; a vector of values used to discretize the potentials.
col	a vector of colors. Note that if breaks is specified there must be one less colors specified than the number of break.
border	color of the polygons borders.
lwd	borders width.
legend.pos	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If legend.pos is "n" then the legend is not plotted.
legend.title.txt	title of the legend.
legend.title.cex	size of the legend title.
legend.values.cex	size of the values in the legend.
legend.values.rnd	number of decimal places of the values in the legend.
legend.frame	whether to add a frame to the legend (TRUE) or not (FALSE).
add	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Details

If var2 is provided the ratio between the potentials of var (numerator) and var2 (denominator) is computed.

Value

An `invisible` sf object (MULTIPOLYGONS) is returned (see [quickStewart](#)).

See Also

[quickStewart](#), [SpatialPosition](#), [choroLayer](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
smoothLayer(x = mtq, var = 'POP',
            span = 4000, beta = 2,
            mask = mtq, border = NA,
            col = carto.pal(pal1 = 'wine.pal', n1 = 8),
            legend.title.txt = "Population\nPotential",
            legend.pos = "topright", legend.values.rnd = 0)
propSymbolsLayer(x = mtq, var = "POP", legend.pos = c(690000, 1599950),
                 legend.title.txt = "Population 2015",
                 col = NA, border = "#ffffff50")
layoutLayer(title = "Actual and Potential Popultation in Martinique")
```

tilesLayer

Plot a Raster Object

Description

Plot a raster object over a map. It can be used to plot tiles from `getTiles` or images from `getPngLayer`.

Usage

```
tilesLayer(x, add = FALSE, ...)
```

```
pngLayer(x, add = FALSE, ...)
```

Arguments

`x` a RasterBrick object; [getPngLayer](#) and [getTiles](#) functions output these objects.
`add` whether to add the layer to an existing plot (TRUE) or not (FALSE).
`...` `bgamma`, `interpolate`, or other arguments passed to be passed to [plotRGB](#)

Note

This function is a wrapper for [plotRGB](#) from the raster package. The accuracy of the final plot depends on the quality of the *.png file, the scale of `x` and the resolution setup of the graphic device.

Author(s)

dieghernan, <https://github.com/dieghernan/>

See Also

[getPngLayer](#), [getTiles](#)

Examples

```
library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"))

## Not run:
# Download the tiles, extent = Martinique
mtqOSM <- getTiles(x = mtq, type = "osm", crop = TRUE)
# Plot the tiles
tilesLayer(mtgOSM)
# Plot countries
plot(st_geometry(mtg), add=TRUE)
txt <- "© OpenStreetMap contributors. Tiles style under CC BY-SA, www.openstreetmap.org/copyright"
mtext(text = txt, side = 1, adj = 0, cex = 0.7, font = 3)

## End(Not run)

# Local image
dirpng <- system.file("img/LogoMartinique.png", package = "cartography")
mask <- getPngLayer(mtg, dirpng, crop = TRUE, margin = 0.5)
par(mar = c(0,0,0,0))
ghostLayer(mtg)
pngLayer(mask, add = TRUE)

## Not run:
# Remote image
urlpng = "https://i.imgur.com/gePiDvB.png"
masksea <- getPngLayer(mtg, urlpng, mode = "wb", inverse = TRUE, margin = 0.5)
#Combine
par(mar = c(0,0,0,0))
ghostLayer(mtg)
pngLayer(mask, add = TRUE)
pngLayer(masksea, add = TRUE)
plot(st_geometry(mtg), border="orange", add=TRUE)

## End(Not run)
```

typoLayer

Typology Layer

Description

Plot a typology layer.

Usage

```

typoLayer(
  x,
  spdf,
  df,
  spdfid = NULL,
  dfid = NULL,
  var,
  col = NULL,
  border = "grey20",
  lwd = 1,
  colNA = "white",
  legend.pos = "bottomleft",
  legend.title.txt = var,
  legend.title.cex = 0.8,
  legend.values.cex = 0.6,
  legend.values.order = NULL,
  legend.nodata = "no data",
  legend.frame = FALSE,
  add = FALSE
)

```

Arguments

<code>x</code>	an sf object, a simple feature collection. If <code>x</code> is used then <code>spdf</code> , <code>df</code> , <code>spdfid</code> and <code>dfid</code> are not.
<code>spdf</code>	a SpatialPolygonsDataFrame.
<code>df</code>	a data frame that contains the values to plot. If <code>df</code> is missing <code>spdf@data</code> is used instead.
<code>spdfid</code>	name of the identifier variable in <code>spdf</code> , default to the first column of the <code>spdf</code> data frame. (optional)
<code>dfid</code>	name of the identifier variable in <code>df</code> , default to the first column of <code>df</code> . (optional)
<code>var</code>	name of the variable to plot.
<code>col</code>	a vector of colors.
<code>border</code>	color of the polygons borders.
<code>lwd</code>	borders width.
<code>colNA</code>	no data color.
<code>legend.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If <code>legend.pos</code> is "n" then the legend is not plotted.
<code>legend.title.txt</code>	title of the legend.
<code>legend.title.cex</code>	size of the legend title.

`legend.values.cex` size of the values in the legend.
`legend.values.order` values order in the legend, a character vector that matches var modalities. Colors will be affected following this order.
`legend.nodata` no data label.
`legend.frame` whether to add a frame to the legend (TRUE) or not (FALSE).
`add` whether to add the layer to an existing plot (TRUE) or not (FALSE).

See Also

[propSymbolsTypoLayer](#), [typoLayer](#), [legendTypo](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package="cartography"))
typoLayer(x = mtq, var="STATUS",
          col = c("aquamarine4", "yellow3", "wheat"),
          legend.values.order = c("Prefecture",
                                "Sub-prefecture",
                                "Simple municipality"),
          legend.pos = "topright",
          legend.title.txt = "Status")
layoutLayer(title = "Municipality Status")
  
```

waffleLayer

Waffle Layer

Description

Plot a waffle layer.

Usage

```

waffleLayer(
  x,
  var,
  cellvalue,
  cellsize,
  cellrnd = "ceiling",
  celltxt = paste0("1 cell = ", cellvalue),
  labels,
  ncols,
  col,
  border = "white",
  lwd = 0.2,
  
```

```

legend.pos = "bottomleft",
legend.title.txt = "legend title",
legend.title.cex = 0.8,
legend.values.cex = 0.6,
legend.frame = FALSE,
add = TRUE
)

```

Arguments

<code>x</code>	an sf object, a simple feature collection.
<code>var</code>	names of the numeric variable to plot.
<code>cellvalue</code>	value of a single cell. Original values are rounded, using <code>cellrnd</code> method, to be expressed as multiple of <code>cellvalue</code> .
<code>cellsize</code>	size of single cell, in map units.
<code>cellrnd</code>	rounding method, one of "ceiling", "floor", "round".
<code>celltxt</code>	text that appears under the legend.
<code>labels</code>	names that will appear in the legend.
<code>ncols</code>	number of columns of the waffles
<code>col</code>	a vector of colors.
<code>border</code>	color of the cells borders.
<code>lwd</code>	cells borders width.
<code>legend.pos</code>	position of the legend, one of "topleft", "top", "topright", "right", "bottomright", "bottom", "bottomleft", "left" or a vector of two coordinates in map units (c(x, y)). If <code>legend.pos</code> is "n" then the legend is not plotted.
<code>legend.title.txt</code>	title of the legend.
<code>legend.title.cex</code>	size of the legend title.
<code>legend.values.cex</code>	size of the values in the legend.
<code>legend.frame</code>	whether to add a frame to the legend (TRUE) or not (FALSE).
<code>add</code>	whether to add the layer to an existing plot (TRUE) or not (FALSE).

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"),
               quiet = TRUE)
# number of employed persons
mtq$EMP <- mtq$ACT - mtq$CHOM

plot(st_geometry(mtq),
     col = "#f2efe9",
     border = "#b38e43",

```



```

      lwd = 0.5)
waffleLayer(
  x = mtq,
  var = c("EMP", "CHOM"),
  cellvalue = 100,
  cellsize = 400,
  cellrnd = "ceiling",
  celltxt = "1 cell represents 100 persons",
  labels = c("Employed", "Unemployed"),
  ncols = 6,
  col = c("tomato1", "lightblue"),
  border = "#f2efe9",
  legend.pos = "topright",
  legend.title.cex = 1,
  legend.title.txt = "Active Population",
  legend.values.cex = 0.8,
  add = TRUE
)

layoutLayer(
  title = "Structure of the Active Population",
  col = "tomato4",
  tabtitle = TRUE,
  scale = FALSE,
  sources = paste0("cartography ", packageVersion("cartography")),
  author = "Sources: Insee and IGN, 2018",
)

```

wordcloudLayer

Wordcloud Layer

Description

Plot a word cloud adjusted to an sf object.

Usage

```

wordcloudLayer(
  x,
  txt,
  freq,
  max.words = NULL,
  cex.maxmin = c(1, 0.5),
  rot.per = 0.1,
  col = NULL,
  fittopol = FALSE,
  use.rank = FALSE,
  add = FALSE,
  breaks = NULL,
)

```

```

    method = "quantile",
    nclass = NULL
  )

```

Arguments

<code>x</code>	an sf object, a simple feature collection (POLYGON or MULTIPOLYGON).
<code>txt</code>	labels variable.
<code>freq</code>	frequencies of txt.
<code>max.words</code>	Maximum number of words to be plotted. least frequent terms dropped
<code>cex.maxmin</code>	integer (for same size in all txt) or vector of length 2 indicating the range of the size of the words.
<code>rot.per</code>	proportion words with 90 degree rotation
<code>col</code>	color or vector of colors words from least to most frequent
<code>fittopol</code>	logical. If true would override <code>rot.per</code> for some elements of <code>x</code>
<code>use.rank</code>	logical. If true rank of frequencies is used instead of real frequencies.
<code>add</code>	whether to add the layer to an existing plot (TRUE) or not (FALSE)
<code>breaks, method, nclass</code>	additional arguments for adjusting the colors of txt, see choroLayer .

Author(s)

dieghernan, <https://github.com/dieghernan/>

References

Ian Fellows (2018). wordcloud: Word Clouds.

R package version 2.6. <https://CRAN.R-project.org/package=wordcloud>

See Also

[choroLayer](#), [legendChoro](#)

Examples

```

library(sf)
mtq <- st_read(system.file("gpkg/mtq.gpkg", package = "cartography"))
par(mar=c(0,0,0,0))
plot(st_geometry(mtq),
     col = "white",
     bg = "grey95",
     border = NA)
wordcloudLayer(
  x = mtq,
  txt = "LIBGEO",
  freq = "POP",
  add = TRUE,

```

```
      nclass = 5
    )
  legendChoro(
    title.txt = "Population",
    breaks = getBreaks(mtg$POP, nclass = 5, method = "quantile"),
    col = carto.pal("blue.pal", 5),
    nodata = FALSE
  )
}
```

Index

barscale, 3

carto.pal, 4, 7
carto.pal.info, 31
cellsize, 28
choroLayer, 5, 50, 51, 60, 66
classIntervals, 13, 14
curl_download, 20

discLayer, 8, 12
display.carto.all (carto.pal), 4
display.carto.pal (carto.pal), 4
dotDensityLayer, 10
download.file, 20

getBorders, 8–10, 12
getBreaks, 6, 7, 9, 13
getFigDim, 15
getGridLayer, 16
getLinkLayer, 17, 25, 27, 48
getOuterBorders (getBorders), 12
getPencilLayer, 18
getPngLayer, 19, 60, 61
getTiles, 19, 21, 60, 61
ghostLayer, 23
gradLinkLayer, 10, 18, 24, 27, 48
gradLinkTypoLayer, 25

hatchedLayer, 28, 38, 39

invisible, 9, 60

labelLayer, 29, 32
layoutLayer, 3, 30, 31, 46
legendBarsSymbols, 32, 51, 53, 55
legendChoro, 7, 34, 51, 66
legendCirclesSymbols, 35, 51, 53, 55
legendGradLines, 10, 25, 27, 37
legendHatched, 28, 38
legendPropLines, 39, 48
legendPropTriangles, 41, 57
legendSquaresSymbols, 42, 51, 53, 55
legendTypo, 39, 43, 55, 63
legendWaffle, 45

mask, 20

north, 46

par, 15
plotRGB, 60
pngLayer, 20
pngLayer (tilesLayer), 60
points, 11
propLinkLayer, 18, 25, 27, 47
propSymbolsChoroLayer, 7, 48, 53
propSymbolsLayer, 11, 49, 51, 51, 55
propSymbolsTypoLayer, 53, 53, 63
propTrianglesLayer, 56

quantile, 13
quickStewart, 58, 60

smoothLayer, 58
SpatialPosition, 58, 60
st_make_grid, 28
st_sample, 11

text, 30
tilesLayer, 22, 60
typoLayer, 55, 61, 63

waffleLayer, 63
wordcloudLayer, 65