Package 'flowmapper'

September 6, 2024

Title Draw Flows (Migration, Goods, Money, Information) on 'ggplot2'
Plots

Version 0.1.2

Description Adds flow maps to 'ggplot2' plots. The flow maps consist of 'ggplot2' layers which visualize the nodes as circles and the bilateral flows between the nodes as bidirectional half-arrows.

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Encoding UTF-8

RoxygenNote 7.2.3

Imports dplyr, ggplot2, tidyr, forcats, scales

URL <https://github.com/JohMast/flowmapper>

BugReports <https://github.com/JohMast/flowmapper/issues>

Depends R (>= 2.10)

LazyData true

NeedsCompilation no

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Repository CRAN

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add_flowmap   *Add a flow map to a ggplot*

Description

Add a flow map to a ggplot

Usage

```
add_flowmap(
  p,
  flowdat = NULL,
  od = NULL,
  nodes = NULL,
  outline_linewidth = 0.01,
  alpha = 0.8,
  nodes_alpha = 0.8,
  outline_col = "black",
  k_nodes = NULL,
  node_buffer_factor = 1.2,
  node_radius_factor = 1,
  edge_offset_factor = 1,
  node_fill_factor = NULL,
  edge_width_factor = 1.2,
  arrow_point_angle = 45,
  add_legend = "none",
  legend_nudge_x = 0,
  legend_nudge_y = 0,
  legend_col = "gray"
)
```

Arguments

p	The plot to which the flowmap should be added.
flowdat	Input dataframe. See details below.
od	As an alternative to flowdat, dataframe with the origin-destination pairs and the flow between them. Must contain the columns o, d, value. nodes must be provided as well. See details below.
nodes	As an alternative to flowdat, a dataframe with the nodes of the network. Must contain the columns name, x, y. See details below.
outline_linewidth	
	The linewidth of the outline of the arrows.
alpha	Opacity of the edges.
nodes_alpha	Opacity of the nodes.
outline_col	Color of the outline of the edges.

k_nodes	Number of clusters to group nodes into. If defined, nodes will be clustered hierarchically based on spatial proximity. By default, no clustering will be applied.
node_buffer_factor	
	Controls the distance between the nodes and the edges (in multiple of the nodes' radii).
node_radius_factor	
	Controls the size of the nodes.
edge_offset_factor	
	Controls the distance between the parallel arrows.
node_fill_factor	
	Controls the downscaling of the fill of the nodes (as to not outshine the edges).
edge_width_factor	
	Controls the width of the edges.
arrow_point_angle	
	Controls the pointiness of the edges.
add_legend	Add a legend for width to the plot? Must be one of "none","bottom","top","left", or "right". (Experimental)
legend_nudge_x	Adjusts the horizontal position of the legend in map units.
legend_nudge_y	Adjusts the vertical position of the legend in map units.
legend_col	If add_legend, controls the color of the legend. Default is grey.

Details

The function requires as inputs a dataframe `flowdat` which contains for every combination of two nodes a and b the coordinates of these nodes as well as the intensity of flow between those nodes in both directions (a to b, b to a). The dataframe should have the following columns:

- **id_a:** The unique id of node a
- **id_b:** The unique id of node b
- **xa:** The x coordinate of node a
- **ya:** The y coordinate of node a
- **xb:** The x coordinate of node b
- **yb:** The y coordinate of node b
- **flow_ab:** The intensity of flow from node a to node b
- **flow_ba:** The intensity of flow from node b to node a

Alternatively, the function can take as input a dataframe od which contains the origin-destination pairs and the flow between them. The dataframe should have the following columns:

- **o:** The unique id of the origin node
- **d:** The unique id of the destination node
- **value:** The intensity of flow between the origin and destination

In this case, the function also requires a dataframe `nodes` which contains the coordinates of the nodes. The dataframe should have the following columns:

- **name:** The unique id of the node
- **x:** The x coordinate of the node
- **y:** The y coordinate of the node

The function will impose coord_equal() on the ggplot.

Inspired by flowmap.gl.

Value

The ggplot with an additional polygon layer for the flow arrows and an additional polygon layer for the nodes

Author(s)

Johannes Mast

Examples

```
testdata <-
data.frame(
 id_a = c("X1","X2","X3","X3","X1"),
 id_b = c("X8","X7","X1","X8","X7"),
 xa = c(2,14,10,10,2),
 ya = c(6,10,9,9,6),
 xb = c(10,4,2,10,4),
 yb = c(4,10,6,4,10),
 flow_ab = c(2,1,1,1,1),
 flow_ba = c(5,1,1,1,2)
)
library(ggplot2)
plot <- ggplot()
plot |> add_flowmap(testdata)
```

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cantons	*cantons*

Description

Geometries of Cantons of Switzerland. CRS is unassigned, but should be EPSG:3857.

Usage

```
cantons
```

Format

cantons:
A sf object with 26 rows and 2 columns:

NAME_1 Name of Canton
geometry polygon coordinates

Source

GADM database <https://gadm.org/>

CH_migration_data	*CH_migration_data*

Description

Internal migrations between Cantons of Switzerland, 2011-2016.

Usage

```
CH_migration_data
```

Format

`CH_migration_data`:

A data frame with 325 rows and 8 columns:

id_a, id_b Names of Cantons A and B

flow_ab Number of migrations from A to B

flow_ba Number of migrations from B to A

xa,ya Longitude and latitude of the centroid of Canton A. Web-Mercator projection (EPSG: 3857)

xb,yb Longitude and latitude of the centroid of Canton B. Web-Mercator projection (EPSG: 3857)

Source

Federal Statistical Office of Switzerland, under OPEN-BY-ASK terms of use: https://www.bfs.admin.ch/bfs/de/home/statistiken/bevoelkerung/migration-integration/binnenwanderung.assetdetail.3222163.html

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get_circle_coords	*Helper function to create coordinates for circles of nodes*

Description

Helper function to create coordinates for circles of nodes

Usage

```
get_circle_coords(center = c(0, 0), r = 1, npoints = 25)
```

Arguments

center	center y and y coordinates
r	radius
npoints	number of points

Value

a dataframe with x and y coordinates of the circle

Author(s)

Johannes Mast, Credit to https://stackoverflow.com/a/6863490

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hca_flowdat	*Use hierarchical clustering to merge nodes based on proximity*

Description

Use hierarchical clustering to merge nodes based on proximity

Usage

```
hca_flowdat(flowdat, k = 20)
```

Arguments

flowdat	The data containing flows from a to b, b to a, and the coordinates of a and b
k	The number of nodes to keep.

Value

a dataframe of the same format as flowdat, but with some nodes (and their flows) merged. Note that this will in most cases contain some circular flows (a to a) even if the input flowdat did not.

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short_scale   *Create short scale format for numbers in the legend*

Description

Create short scale format for numbers in the legend

Usage

```
short_scale(x, digits = 3)
```

Arguments

x	The number
digits	Significant digits

Author(s)

Johannes Mast, credit: https://stackoverflow.com/a/59086755

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util_data_flow_to_flowdat
                    util_data_flow_to_flowdat

Description

This function takes a flow data frame in long format and a data frame with the nodes coordinates and returns a flowdat data frame

Usage

```
util_data_flow_to_flowdat(nodes, flows)
```

Arguments

nodes	A data frame with the nodes of the network
flows	A data frame with the flow data

Details

Helper function to merge od data in long data and nodes to flowdat format

Value

A data frame with the flow data in flowdat format

Author(s)

Johannes Mast,

Examples

```
#nodes <- data.frame(name=c("a","b","c"),x=c(0,1,2),y=c(0,1,2))
#flow <- data.frame(o=c("a","b"),d=c("b","c"),value=c(1,2))
#util_data_flow_to_flowdat(nodes,flow)
```

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