Package ‘halfcircle’

Type Package
Title Plot Halfcircle Diagram
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Description There are growing concerns on flow data in diverse fields including trade, migration, knowledge diffusion, disease spread, and transportation. The package is an effective visual support to learn the pattern of flow which is called halfcircle diagram. The flow between two nodes placed on the center line of a circle is represented using a half circle drawn from the origin to the destination in a clockwise direction. Through changing the order of nodes, the halfcircle diagram enables users to examine the complex relationship between bidirectional flow and each potential determinants. Furthermore, the halfmeancenter function, which calculates (un) weighted mean center of half circles, makes the comparison easier.
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**ex_flow**  
*Traded volume of land between countries*

**Description**
A dataset containing trade data between countries and traded volumes for each 4 category.

**Usage**
```
data(ex_flow)
```

**Format**
A data frame with 10866 rows and 6 variables:

- **O** name of exporting country
- **D** name of importing country
- **vegetable** volume of land associated with trading vegetables, in ha
- **fruit** volume of land associated with trading fruits, in ha
- **wheat** volume of land associated with trading wheats, in ha
- **soybean** volume of land associated with trading soybeans, in ha

**Source**
http://fao.org/faostat/

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**ex_node**  
*country attributes*

**Description**
A dataset containing 154 countries who participate in the trade and related attributes.

**Usage**
```
data(ex_node)
```
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Format

A data frame with 154 rows and 8 variables:

- **country** name of exporting country
- **x** longitude of the center of a country
- **y** latitude of the center of a country
- **pop_total** total number of population
- **gdpc** Gross Domestic Product per capita, in dollar
- **area_cultivation** total volume land for cultivation use, in ha
- **water_total** total volume of usable water, in cubic meter
- **income_level** 5 levels by income

Source


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**halfcircle**

*Visualization method for flow data using halfcircle diagram*

Description

halfcircle function draws flows between nodes creating halfcircle diagram.

Usage

```r
halfcircle(flow, node, dir = "horizontal", circle.col = "lightgray",
circle.trans = 0.5, flow.col = "black", flow.trans = 0.5,
flow.width = "proportional", node.color = "black", node.size = 0.1,
node.pch = 20, node.trans = 0.7, label = node[, c(1)],
label.size = 0.5, label.col = "black", label.gap = 0.1)
```

Arguments

- **flow** a dataframe which is to draw half-circles. The data should be in the form of an edge list containing node of origin, node of destination, and magnitude of the flow on the first three columns.
- **node** a dataframe which contains names of node on the first column. Nodes on the center line of a circle are drawn by the order of the data. Every node presented in flow data must be contained.
- **dir** if 'horizontal' (the default), nodes are drawn along the X-axis. If 'vertical', nodes are drawn along the Y-axis.
- **circle.col** color of background circle
- **circle.trans** transparency of color of background circle
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flow.col  flow color. flow.col can be a list of color vectors, the vectors are then used per flow.
flow.trans  transparency of color of flows
flow.width  width of flows. if 'proportional' (the default), each width is calculated to be proportional to the maximum volume of flows. Maximum width is set to be 10. Otherwise, a list of width vectors can be used per flow.
node.color  node color. It can be a list of color vectors, and the vectors are then used per node.
node.size  node size
node.pch  node type. see ?points for more options.
node.trans  transparency of color of flows
label  the first column of node, names, is represented (the default). a list of vector an be used per node. if NULL, no label is drawn.
label.size  label size
label.col  label color
label.gap  gap between the node and the respective label

Details

This function is a low-level graphical function, and you will create a halfcircle diagram. To create the diagram, nodes are placed as a set of points on a straight line segment in the center of a circle. The flow between two nodes is represented using a half circle drawn from the origin to the destination in a clockwise direction. It is virtually drawn on xy-coordinates where both x and y range from -1 to 1. Flows between the same nodes are not drawn.

Author(s)

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References


Examples

# load flow data
data(ex_flow)
flow <- ex_flow[,c(1,2,3)] # select veget column as volume
flow <- subset(flow,flow$vegetable>0.01)
data(ex_node) # load node data
node <- ex_node[order(-ex_node$gdpc),] # sort nodes in descending order of gdpc values
halfcircle(flow, node, dir="vertical", circle.col="gray", flow.col="black",label=NULL)

# legend
max <- max(flow[,c(3)]); median <- median(flow[,c(3)]); min <- min(flow[,c(3)])
max_w <- 10; median_w <- round(10*median/max); min_w <- round(10*min/max)
legend(x=-1.2, y=-0.8, legend=c(paste(round(max)), paste(round(median)), paste(round(min))),

...
halfmeancenter

Calculate average values of flows and plot them

Description

Calculate average values of flows and plot them

Usage

halfmeancenter(flow, node, dir = "horizontal")

Arguments

flow a dataframe which is to draw half-circles. The data should consist of node of origin, node of destination, and magnitude of the flow on the first three columns.

node a dataframe which contains names of node on the first column. Nodes on the center line of a circle are drawn by the order of the data.

dir if 'horizontal', nodes are drawn along the X-axis. If 'vertical', nodes are drawn along the Y-axis.

Details

This function is to get values of mean centers and average radius of flows. One of values of mean centers is weighted by the magnitude of flow and the other one is unweighted. If flows are normally distributed or all combinations of flows between nodes are made, the mean center should be located in the center of a circle, that is (0,0) on the xy-coordinates, and average radius should be 0.5. If the mean center fall in a certain quadrant, a user can evaluate the skewedness.

Value

A list containing calculated average values c(x-coordinate of weighted mean center, y-coordinate of weighted mean center, weighted average radius,x-coordinate of unweighted mean center, y-coordinate of unweighted mean center, unweighted average radius)
Author(s)
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Examples
data(ex_flow)
flow <- subset(ex_flow, ex_flow$veget>5000)
data(ex_node)
node <- ex_node[c(order(-ex_node$gdpc)),]
halfmeancenter(flow, node, dir="vertical")
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