Package 'OrigamiPlot'

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Type Package

Title A Visualization Tool Enhancing Radar Plot Visualizations for Multivariate Data

Version 0.2.0

Description A visualization tool for multivariate data. This package maintains the original functionality of a radar chart and avoids potential misuse of its connected regions, with newly added features to better assist multi-criteria decision-making.

Imports fmsb, plotrix, grDevices

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Contents

`area_calculation` *Function to calculate area of the generated polygon*

Description

Function to calculate area of the generated polygon

Usage

```
area_calculation(df)
```

Arguments

`df`	input dataframe in the required format

Details

This function serves as a supplementary tool to compute the area of each generated origami plot when the maximal area achievable within the defined parameters (when all the variables attain 1) is set to 1. The resulting calculated area offers an interpretation of the proportion between the actual origami plot and the maximum achievable area.

Value

result

Examples

```
data(sucra)
area_calculation(sucra)
```

data_preparation *Function to prepare the data into designated format*

Description

Function to prepare the data into designated format

Usage

```
data_preparation(df, min_value = NULL)
```

Arguments

df	dataset with each column representing a variable name paired with its value and each row representing a graph
min_value	auxiliary point in the graph, default is min(df)/2

Details

This function takes a single-row dataframe as input and output a formatted dataframe. It introduces an auxiliary point for each variable, positioned equidistantly from the central point along auxiliary axes. Users can customize the distance from the point to the center. Without user customization, the distance defaults to half of the smallest value within the dataset.

Value

df

Examples

```
data(sucra)
data_preparation(sucra,min_value=0.15)
```

origami_plot *Function to generate origami plot*

Description

Function to generate origami plot

Usage

```
origami_plot(
  df,
  object,
  min_value = NULL,
  pcol = rgb(0.2, 0.5, 0.5, 1),
  pfcol = rgb(0.2, 0.5, 0.5, 0.1),
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

df	input dataframe in the required format
object	the name of the row that user wants to plot
min_value	auxiliary point in the graph, default is min(df)/2
pcol	color of the line of the polygon, default is rgb(0.2,0.5,0.5,1).
pfcol	color to fill the area of the polygon, default is rgb(0.2,0.5,0.5,0.1).
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4

cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This is the main function in the R package that takes a list of data frame(s) and constructs an origami plot. The function plots the main axes of the radar chart as solid lines and marks the score of each variable on these axes with a filled circle. Additionally, it plots auxiliary axes as dashed lines at equal distances between each neighboring pair of primary axes with auxiliary points generated from data_preparation. Finally, the function connects all the points in order and obtain a connected region that resembles an origami star. Through this method, we successfully address the challenge of axis order affecting the area of the connected region in radar plots. The plot generated using 'origami_plot' benefit in that the area of the connected region within the origami plot remains consistent regardless of axis sequence.

Value

No return value, called for visualization

Examples

```
data(sucra)
origami_plot(sucra, object="Intravertical PGE2")
```

`origami_plot_pairwise` *Function to generate pairwise origami plot*

Description

Function to generate pairwise origami plot

Usage

```
origami_plot_pairwise(
  df,
  object1,
  object2,
  min_value = NULL,
  pcol1 = rgb(0.2, 0.5, 0.5, 1),
  pfcol1 = rgb(0.2, 0.5, 0.5, 0.1),
  pcol2 = rgb(0.6, 0.3, 0.3, 1),
  pfcol2 = rgb(0.6, 0.3, 0.3, 0.1),
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

`df`	input dataframe in the required format
`object1`	the name of the first row that user wants to plot
`object2`	the name of the second row that user wants to plot
`min_value`	auxiliary point in the graph, default is min(df)/2

pcol1	color of the line of the first polygon, default is rgb(0.2,0.5,0.5,1)
pfcol1	color to fill the area of the first polygon, default is rgb(0.2,0.5,0.5,0.1).
pcol2	color of the line of the second polygon, rgb(0.6,0.3,0.3,1)
pfcol2	color to fill the area of the second polygon, default is rgb(0.6,0.3,0.3,0.1).
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4
cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This function is an adaptation of the original origami_plot function, designed to visualize two datasets within a single graph. Pairwise origami plots can serve as a potent tool for conducting comparisons across various levels, offering unique insights into the data being analyzed

Value

No return value, called for visualization

Examples

```
data(sucra)
origami_plot_pairwise(sucra, object1="Intravertical PGE2", object2="High-dose oral misoprostol")
```

`origami_plot_weighted` *Function to generate weighted origami plot*

Description

Function to generate weighted origami plot

Usage

```
origami_plot_weighted(
  df,
  object,
  weight,
  min_value = NULL,
  pcol = rgb(0.2, 0.5, 0.5, 1),
  pfcol = rgb(0.2, 0.5, 0.5, 0.1),
  pcol2 = rgb(0.6, 0.3, 0.3, 1),
  pfcol2 = NULL,
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

`df`	input dataframe in the required format
`object`	the name of the row that user wants to plot
`weight`	weight of each variable, sum up to 1
`min_value`	auxiliary point in the graph, default is min(df)/2

pcol	color of the line of the original polygon, default is rgb(0.2,0.5,0.5,1)
pfcol	color to fill the area of the original polygon, default is rgb(0.2,0.5,0.5,0.1).
pcol2	color of the line of the weighted polygon, default is rgb(0.6,0.3,0.3,1).
pfcol2	color to fill the area of the weighted polygon, default is NULL.
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4
cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This function allows the creation of an origami plot with user-specified weights for different outcomes. The weighted origami plot is a refined analytical tool that facilitates the adjustment of individual attribute weights to accurately reflect their significance in determining overall performance. For instance, if certain outcomes hold greater clinical relevance based on a scientific question, the user can assign higher weights to these outcomes relative to others. Note that the weights assigned should sum up to 1.

Value

No return value, called for visualization

Examples

```
data(sucra)
origami_plot_weighted(sucra, object="Intravertical PGE2", weight = c(0.15,0.25,0.3,0.2,0.1))
```

`snowflake_plot` *Function to generate origami plot*

Description

Function to generate origami plot

Usage

```
snowflake_plot(
  df,
  object,
  min_value = NULL,
  pcol = rgb(0.2, 0.5, 0.5, 1),
  pfcol = rgb(0.2, 0.5, 0.5, 0.1),
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

`df`	input dataframe in the required format
`object`	the name of the row that user wants to plot

min_value	auxiliary point in the graph, default is min(df)/2
pcol	color of the line of the polygon, default is rgb(0.2,0.5,0.5,1).
pfcol	color to fill the area of the polygon, default is rgb(0.2,0.5,0.5,0.1).
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4
cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This is an alias version of the function origami_plot.

Value

No return value, called for visualization

Examples

```
data(sucra)
snowflake_plot(sucra, object="Intravertical PGE2")
```

snowflake_plot_pairwise

Function to generate pairwise origami plot

Description

Function to generate pairwise origami plot

Usage

```
snowflake_plot_pairwise(
  df,
  object1,
  object2,
  min_value = NULL,
  pcol1 = rgb(0.2, 0.5, 0.5, 1),
  pfcol1 = rgb(0.2, 0.5, 0.5, 0.1),
  pcol2 = rgb(0.6, 0.3, 0.3, 1),
  pfcol2 = rgb(0.6, 0.3, 0.3, 0.1),
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

df	input dataframe in the required format
object1	the name of the first row that user wants to plot
object2	the name of the second row that user wants to plot

min_value	auxiliary point in the graph, default is min(df)/2
pcol1	color of the line of the first polygon, default is rgb(0.2,0.5,0.5,1)
pfcol1	color to fill the area of the first polygon, default is rgb(0.2,0.5,0.5,0.1).
pcol2	color of the line of the second polygon, rgb(0.6,0.3,0.3,1)
pfcol2	color to fill the area of the second polygon, default is rgb(0.6,0.3,0.3,0.1).
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4
cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This function is an alias version of function origami_plot_pairwise

Value

No return value, called for visualization

Examples

```
data(sucra)
snowflake_plot_pairwise(sucra, object1="Intravertical PGE2", object2="High-dose oral misoprostol")
```

snowflake_plot_weighted *Function to generate weighted origami plot*

Description

Function to generate weighted origami plot

Usage

```
snowflake_plot_weighted(
  df,
  object,
  weight,
  min_value = NULL,
  pcol = rgb(0.2, 0.5, 0.5, 1),
  pfcol = rgb(0.2, 0.5, 0.5, 0.1),
  pcol2 = rgb(0.6, 0.3, 0.3, 1),
  pfcol2 = NULL,
  axistype = 1,
  seg = 4,
  pty = 16,
  plty = 1:6,
  plwd = 1,
  pdensity = NULL,
  pangle = 45,
  cglty = 1.4,
  cglwd = 0.1,
  cglcol = "#000000",
  axislabcol = "#808080",
  title = "",
  na.itp = TRUE,
  centerzero = TRUE,
  vlabels = NULL,
  vlcex = 1,
  caxislabels = seq(0, 1, by = 0.25),
  calcex = NULL,
  paxislabels = NULL,
  palcex = NULL
)
```

Arguments

df	input dataframe in the required format
object	the name of the row that user wants to plot
weight	weight of each variable, sum up to 1

min_value	auxiliary point in the graph, default is min(df)/2
pcol	color of the line of the original polygon, default is rgb(0.2,0.5,0.5,1)
pfcol	color to fill the area of the original polygon, default is rgb(0.2,0.5,0.5,0.1).
pcol2	color of the line of the weighted polygon, default is rgb(0.6,0.3,0.3,1).
pfcol2	color to fill the area of the weighted polygon, default is NULL.
axistype	type of axes. 0:no axis label. 1:center axis label only. 2:around-the-chart label only. 3:both center and around-the-chart labels. Default is 1.
seg	number of segments for each axis, default is 4.
pty	point symbol, default is 16. 32 means not printing the points.
plty	line types for plot data, default is 1:6
plwd	line widths for plot data, default is 1
pdensity	filling density of polygons, default is NULL
pangle	angles of lines used as filling polygons, default is 45
cglty	line type for radar grids, default is 1.4
cglwd	line width for radar grids, default is 0.1
cglcol	line color for radar grids, default is #000000
axislabcol	color of axis label and numbers, default is #808080
title	title of the chart, default is blank
na.itp	logical. If true, items with NA values are interpolated from nearest neighbor items and connect them. If false, items with NA are treated as the origin. Default is TRUE.
centerzero	logical. If true, this function draws charts with scaling originated from (0,0). If false, charts originated from (1/segments). Default is TRUE.
vlabels	character vector for the names for variables, default is NULL
vlcex	font size magnification for vlabels, default is 1
caxislabels	center axis labels, default is seq(0,1,by = 0.25)
calcex	font size magnification for caxislabels, default is NULL
paxislabels	around-the-chart labels, default is NULL
palcex	font size magnification for paxislabels, default is NULL

Details

This is the alias version of origami_plot_weighted function.

Value

No return value, called for visualization

Examples

```
data(sucra)
snowflake_plot_weighted(sucra, object="Intravertical PGE2", weight = c(0.15,0.25,0.3,0.2,0.1))
```

sucra *SUCRA*

Description

A dataset containing example data.

Usage

```
sucra
```

Format

A data frame with 8 rows and 5 variables:

caesarean Caesarean section

maternal Serious maternal morbidity or death

neonatal Serious neonatal morbidity or perinatal death

hyperstimulation Hyperstimulation

vaginal Vaginal delivery not within 24 hours

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