Package ‘multigraph’

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Plot and Manipulate Multigraphs

Description

Functions to create and manipulate multigraphs, bipartite graphs, and weighted multigraphs

Details

Package: multigraph
Type: Package
Version: 0.50 (devel)
Depends: multiplex (>= 2.5)
Date: 24 January 2017
License: GPL-3

This package contains functions to create, plot and manipulate multigraphs, weighted multigraphs, and bipartite graphs with multiple edges. It depends on routines from the multiplex package with version at least 2.5

Author(s)

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See Also

multiplex-package, incubs, zbind

bmgraph

Bipartite multigraph

Description

A function to create and manipulate bipartite multigraphs with different layouts

Usage

bmgraph(net, layout = c("bip", "bip3", "bip3e", "bip4", "force", "rand", "circ", "stress", "CA"), outline, coord, tceX, alpha = c(1, 1, 1), showLbs, showAttS, att = NULL, lbat = "1", main = NULL, cex.main, bg, mar, directed, weighted, collRecip, cex, pos, lwd, lty, ecol, vcol, vcol0, asp, seed = NULL, maxiter = 100, bwd, clu, pch, tcol, rot, mirrorX, mirrorY, col, hds, vedist, jitter, ...)
bmgraph

Arguments

net  data frame or array representing the two-mode network (see details)
layout the visualization layout: bip (default) bipartite graph bip3 bipartite graph with
            three columns bip3e bipartite graph with three columns for events bip4 "square"
            bipartite graph force force-directed algorithm rand random circ circular stress
            stress-majorization algorithm CA correspondence analysis
outline (optional) the outline of the graph (see details)
coord (optional) data frame with the coordinates of the vertices. If coordinates are
        given then the layout option is ignored
tcex  size of the vertex labels. If NULL, it depends on the value of cex
alpha vector (vertex, edge, bg) with the alpha color transparency
showLbs (optional and logical) whether or not show the vertex labels
showatts (optional and logical) whether or not show the vertex attribute labels
att  (optional) a vector or an array representing the vertices’ attributes
lbat  (optional) the labels for the vertices’ attributes
main  (optional) title of the plot
cex.main  (optional) the size of the plot’s title
bg  (optional) the background color of the plot
mar  (optional) the margins of the plot
directed (optional and logical) whether or not the graph is directed or undirected
weighted (optional and logical) whether or not the graph is weighted or dichotomous
collRecip (optional and logical) whether or not collapse reciprocated edges in the unidrected
        graph
cex  (optional) the size of the vertices
pos  (optional) the position of the vertices’ labels (0 means “in the middle of the
        vertex”)
lwd  (optional) the width of the edges. Ignored if weighted is set to TRUE
lty  (optional) the shape of the edges
ecol  (optional) the color of the edges
vcol  (optional) the color of the vertices
vcol0 (optional) the color of the vertices’ contour (only works for pch 21 through 25
asp  (optional) the aspect ratio of the plot
seed (optional) the random seed number for the vertices’ initial coordinates. Ignored
        except for force, stress and rand
maxiter  (optional) the maximum number of iterations in layout algorithms. Ignored ex-
        cept for force, stress and rand
bwd  (optional) the width of the bundle edges. Ranges from 0 (edges collapsed) to the
default 1 (depending on the vertices’ size). For weighted a value greater than
one is possible
clu  (optional) the clustering of the vertices (see details)
pch  (optional) the symbol representing the vertices
tcol (optional) the color of the vertices’ labels
rot  (optional) clockwise rotation of the graph in degrees
mirrorX (optional) mirror of the X axis
mirrorY (optional) mirror of the Y axis
col  (optional) alias for vcol
hds  (optional and experimental) arcs’ head scale
vedist (optional and experimental) a real number with vertex - edge distance
jitter (optional) the jitter in stress or CA
... Additional argument items (see e.g. par)

Details
Bipartite graphs are visualization devices for two-mode networks. Although this type of data would typically record as a data frame, it is possible to use even three dimensional arrays where each level corresponds to a particular type of tie, and thus the bipartite graphs in this case will be depicted with parallel edges. Besides, it is possible to obtain a graph of the bipartite network using the binomial approach to two-mode data, and plot it with a forced directed algorithm.

Value
A plot of the two-mode networks as bipartite graph or multigraph

Author(s)
Antonio Rivero Ostoic

See Also
multigraph, frcd, stsm, conc

Examples
## Create the data: two binary relations among three elements
arr <- round( replace( array(runif(18), c(3,3,2)), array(runif(18), c(3,3,2))>.5, 3 ) )

## Plot this network as bipartite graph
bmgraph(arr)
**Description**

A function to compute the graph coordinated system with a concentric layout

**Usage**

conc(net, nr, irot, inv, flip, ...)

**Arguments**

- **net**: an array representing the network relations
- **nr**: a scalar with the number of radii, or a vector with the clustering of the actors.
- **irot**: a scalar or vector with the “internal rotation” for each circle from closer to the center point to further away
- **inv**: (optional and logical) should the circles be with an inverted ordering?
- **flip**: (optional and logical) should the alternating circles be flipped?
- **...**: Additional argument items

**Details**

In a Euclidean plane computes the coordinated system with a concentric layout with at least two radii (unless $n = 1$). In case $nr$ is not specified, approx. half of the vertices are located at one radius and half in another one.

The clustering of the actors may be used to establish the location of the vertices in different radii as a numerical, character, or a factor vector.

**Value**

A data frame with the coordinated system with two columns representing the abscissa and the ordinate in a two-dimensional rectangular Cartesian coordinate system.

**Author(s)**

Antonio Rivero Ostoic

**See Also**

- multigraph
- bmgraph
- frcd
- stsm
Description

A function to compute the graph coordinated system with a force directed layout algorithm.

Usage

```r
frcd(net, seed = seedL maxiterL drpL NNN)
```

Arguments

- `net` : an array representing the network relations
- `seed` (mandatory) : the seed of the initial layout (see details)
- `maxiter` (optional) : the maximum number of iterations
- `drp` (optional) : for weighted networks, drop values less than specified
- `...` : Additional argument items

Details

This function was meant as an internal routine for graph visualization; however, it can be used with the `coord` option both in `multigraph` and `bmgraph` where a random seed is stated by `NULL`.

Value

A data frame with the coordinated system with two columns representing the abscissa and the ordinate in a two-dimensional rectangular Cartesian coordinate system.

Author(s)

Antonio Rivero Ostoic

References


See Also

- `multigraph`
- `bmgraph`
- `stsm`
- `conc`
**multigraph**

*Multigraphs and weighted multigraphs*

**Description**

A function to create and manipulate multigraphs and weighted multigraphs with different layout options.

**Usage**

```r
multigraph(net, layout = c("circ", "force", "stress", "conc", "rand"), outline,
  directed = TRUE, main = NULL, seed = NULL, maxiter = 100, alpha = c(1, 1, 1),
  collRecip, showLbs, showAtts, weighted, cex.main, coord, clu, cex, lwd,
  pch, lty, bwd, tcol, tcex, att, bg, mar, pos, asp, ecol, vc10, vc10, hds,
  vedist, rot, mirorX, mirorY, col, lbat, drp, ...)
```

**Arguments**

- **net**: an array; usually with three dimensions of stacked matrices where the multiple relations are placed.
- **layout**: the visualization layout: circ circular force force-directed algorithm stress stress-majorization algorithm conc concentric rand random
- **outline**: (optional) the outline of the graph (see details)
- **directed**: (logical) whether or not the graph is directed or undirected
- **main**: (optional) title of the plot
- **seed**: (optional) the random seed number for the vertices' initial coordinates. Ignored for circ and conc
- **maxiter**: (optional) the maximum number of iterations in layout algorithms. Ignored for circ and conc
- **alpha**: vector (vertex, edge, bg) with the alpha color transparency
- **collRecip**: (optional and logical) whether or not collapse reciprocated edges in the undirected graph
- **showLbs**: (optional and logical) whether or not show the vertex labels
- **showAtts**: (optional and logical) whether or not show the vertex attribute labels
- **weighted**: (optional and logical) whether or not the graph is weighted or dichotomous
- **cex.main**: (optional) the size of the plot's title
- **coord**: (optional) data frame with the coordinates of the vertices. If coordinates are given then the layout option is ignored
- **clu**: (optional) the clustering of the vertices (see details)
- **cex**: (optional) the size of the vertices
- **lwd**: (optional) the width of the edges. Ignored if weighted is set to TRUE
- **pch**: (optional) the symbol representing the vertices
multigraph

lty (optional) the shape of the edges
bwd (optional) the width of the bundle edges. Ranges from 0 (edges collapsed) to the default 1 (depending on the vertices’ size). For weighted a value greater than one is possible
tcol (optional) the color of the vertices’ labels
tcex size of the vertex labels. If NULL, it depends on the value of cex
att (optional) a vector or an array representing the vertices’ attributes
bg (optional) the background color of the plot
mar (optional) the margins of the plot
pos (optional) the position of the vertices’ labels (0 means “in the middle of the vertex”)
asp (optional) the aspect ratio of the plot
ecol (optional) the color of the edges
col (optional) alias for vcol
vcol (optional) the color of the vertices
vcol0 (optional) the color of the vertices’ contour (only works for pch 21 through 25
hds (optional) the background color of the plot
vedist (optional and experimental) a real number with vertex - edge distance
rot (optional) clockwise rotation of the graph in degrees
mirrorX (optional) mirror of the X axis
mirrorY (optional) mirror of the Y axis
col (optional) alias for vcol
lbet (optional) the labels for the vertices’ attributes
drp (optional) for weighted networks, drop values less than specified
...

Details

Multigraph are graph having parallel edges depicting different types of relations in a network. By default a circular layout is applied where each type of tie has a distinctive shape and gray color scale. For a better visualization, undirected multigraphs automatically collapse the reciprocal ties, and there as an argument to prevent this to happen. It is possible to combine the symbols and color of vertices by assigning a class to each network member in the clustering option. Vertices can also have different sizes by specifying the argument with a vector with a length size similar to the network order.

Value

A plot of the network as a multigraph or a weighted multigraph.

Author(s)

Antonio Rivero Ostoic
See Also

bmgraph, frcd, stsm, conc

Examples

```r
## Create the data: two binary relations among three elements
arr <- round(replace(array(runif(18), c(3,3,2)), array(runif(18), c(3,3,2)) > .5, 3))

## Plot the multigraph of this network
multigraph(arr)

## Now with a force directed algorithm
multigraph(arr, layout = "force")
```

---

**stsm**

*Stress majorization layout*

Description

A function to compute the graph coordinated system with a stress majorization layout algorithm.

Usage

```r
stsm(net, seed = seed, maxiter = 40, drp, jitter, method, ...)
```

Arguments

- `net` an array representing the network relations
- `seed` (mandatory) the seed of the initial layout (see details)
- `maxiter` (optional) the maximum number of iterations
- `drp` (optional) for weighted networks, drop values less than specified
- `jitter` (optional) jitter in the layout
- `method` (optional) initial distance method (default binary)
- `...` Additional argument items

Details

This function was meant as an internal routine for graph visualization; however, it can be used with the `coord` option both in `multigraph` and `bmgraph` where a random seed is stated by NULL.

Value

A data frame with the coordinated system with two columns representing the abscissa and the ordinate in a two-dimensional rectangular Cartesian coordinate system.
Author(s)

Antonio Rivero Ostoic

References


See Also

*multigraph, bmgraph, frcd, conc*
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