Package 'migraph'

May 14, 2021

Title Multimodal and Multilevel Network Analysis

Version 0.6.6

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Description A set of tools that extend common social network analysis packages for analysing multimodal and multilevel networks.
It includes functions for one- and two-mode (and sometimes three-mode) centrality, centralization, clustering, and constraint,
as well as for one- and two-mode network regression and block-modelling.
All functions operate with matrices, edge lists,
and 'igraph', 'network'/'sna', and 'tidygraph' objects.
The package is released as a complement to
'Multimodal Political Networks' (2021, ISBN:9781108985000),
and includes various datasets used in the book.

URL https://github.com/snlab-ch/migraph

BugReports https://github.com/snlab-ch/migraph/issues

Depends R (>= 3.6.0)

License MIT + file LICENSE

Language en-GB

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Imports igraph, tidygraph, ggplot2, magrittr, rlang, dplyr, purrr, tibble, tidyr, network, httr, jsonlite, lubridate, stringr

Suggests testthat, roxygen2, covr, knitr, rmarkdown

NeedsCompilation no

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R topics documented:

`blockmodel` *Blockmodelling*

Description

Blockmodelling

Usage

```
blockmodel_concor(
  object,
  p = 1,
  cutoff = 0.999,
  max.iter = 25,
  block.content = "density"
)

## S3 method for class 'blockmodel'
print(x, ...)
```

Arguments

`object`	A migraph-consistent object (matrix, igraph, tidygraph).
`p`	An integer representing the desired number of partitions.
`cutoff`	A value between 0 and 1 used to determine convergence.
`max.iter`	An integer representing the maximum number of iterations.
`block.content`	A string indicating which method to use for calculating block content. Options are: "density", "sum", "meanrowsum", "meancolsum", "median", "min", "max".
`x`	An object of class "blockmodel"
`...`	Additional arguments passed to generic print method

Source

https://github.com/aslez/concoR

References

Breiger, R.L., Boorman, S.A., and Arabie, P. 1975. An Algorithm for Clustering Relational Data with Applications to Social Network Analysis and Comparison with Multidimensional Scaling. *Journal of Mathematical Psychology*, 12: 328–383.

Examples

```
mex_concor <- blockmodel_concor(mpn_elite_mex)
mex_concor
plot(mex_concor)
usa_concor <- blockmodel_concor(mpn_elite_usa_advice)
usa_concor
plot(usa_concor)
```

`centrality` *Centrality for one- and two-mode networks*

Description

These functions calculate common centrality measures for both one- and two-mode networks. They accept as objects matrices and `igraph` graphs, and can be used within a tidygraph workflow. Importantly, these functions also offer correct normalization for two-mode networks.

Usage

```
node_degree(
  object,
  weights = NULL,
  mode = "out",
  loops = TRUE,
  normalized = FALSE
```

```
)

node_closeness(
  object,
  weights = NULL,
  mode = "out",
  normalized = FALSE,
  cutoff = NULL
)

node_betweenness(
  object,
  weights = NULL,
  directed = TRUE,
  cutoff = NULL,
  nobigint = TRUE,
  normalized = FALSE
)

node_eigenvector(
  object,
  weights = NULL,
  directed = FALSE,
  options = igraph::arpack_defaults,
  scale = FALSE,
  normalized = FALSE
)
```

Arguments

object	Either an igraph graph object or a matrix.
weights	The weight of the edges to use for the calculation. Will be evaluated in the context of the edge data.
mode	How should edges be followed. Ignored for undirected graphs
loops	Should loops be included in the calculation
normalized	For one-mode networks, should Borgatti and Everett normalization be applied?
cutoff	maximum path length to use during calculations
directed	Should direction of edges be used for the calculations
nobigint	Should big integers be avoided during calculations
options	Settings passed on to `igraph::arpack()`
scale	Should the scores be scaled to range between 0 and 1?

Value

Depending on how and what kind of an object is passed to the function, the function will return a `tidygraph` object where the nodes have been updated

A numeric vector giving the betweenness centrality measure of each node.

A numeric vector giving the eigenvector centrality measure of each node.

References

Borgatti, Stephen P., and Martin G. Everett. "Network analysis of 2-mode data." Social networks 19.3 (1997): 243-270.

Faust, Katherine. "Centrality in affiliation networks." Social networks 19.2 (1997): 157-191.

See Also

Other two-mode measures: `centralization`, `graph_clustering()`, `node_constraint()`, `node_smallworld()`

Other node-level measures: `node_constraint()`, `node_smallworld()`

Examples

```
node_degree(mpn_elite_mex)
node_degree(southern_women)
node_closeness(mpn_elite_mex)
node_closeness(southern_women)
node_betweenness(mpn_elite_mex)
node_betweenness(southern_women)
node_eigenvector(mpn_elite_mex)
node_eigenvector(southern_women)
```

---

centralization *Centralization for one- and two-mode networks*

Description

These functions measure the overall centralization for a network.

Usage

```
graph_degree(
  object,
  directed = c("all", "out", "in", "total"),
  normalized = TRUE
)

graph_closeness(
  object,
  directed = c("all", "out", "in", "total"),
  normalized = TRUE
)

graph_betweenness(
```

```
  object,
  directed = c("all", "out", "in", "total"),
  normalized = TRUE
)
```

Arguments

`object`	A matrix, igraph graph, or tidygraph object.
`directed`	Character string, “out” for out-degree, “in” for in-degree, and "all" or “total” for the sum of the two. For two-mode networks, "all" uses as numerator the sum of differences between the maximum centrality score for the mode against all other centrality scores in the network, whereas "in" uses as numerator the sum of differences between the maximum centrality score for the mode against only the centrality scores of the other nodes in that nodeset.
`normalized`	Logical scalar, whether the centrality scores are normalized. Different denominators are used depending on whether the object is one-mode or two-mode, the type of centrality, and other arguments.

Value

A single centralization score if the object was one-mode, and two centralization scores if the object was two-mode. In the case of a two-mode network, to return just the score for the first nodeset (rows), append $nodes1 to the end of the function call or returned object. To return just the score for the second nodeset (cols), append $nodes2 to the end of the function call or returned object.

References

Borgatti, Stephen P, and Daniel S Halgin. 2011. “Analyzing Affiliation Networks." In *The SAGE Handbook of Social Network Analysis*, edited by John Scott and Peter J Carrington, 417–33. London, UK: Sage.

See Also

Other two-mode measures: `centrality`, `graph_clustering()`, `node_constraint()`, `node_smallworld()`

Examples

```
graph_degree(southern_women, directed = "in")
graph_closeness(southern_women, directed = "in")
graph_betweenness(southern_women, directed = "in")
```

coercion *Coercion between migraph-consistent object classes*

Description

The as_ functions in {migraph} coerce objects between several common classes of social network objects. These include:

- adjacency and incidence matrices
- edgelists (as data frames)
- {igraph} graph objects
- {tidygraph} tbl_graph objects
- {network} network objects

Usage

```
as_matrix(object)

as_igraph(object, twomode = FALSE)

as_tidygraph(object, twomode = FALSE)

as_network(object)
```

Arguments

object	A data frame edgelist, matrix, igraph, tidygraph, or network object.
twomode	An option to override the heuristics for distinguishing incidence from adjacency matrices. By default FALSE.

Details

Behaviour is a little different depending on the data format.

If the data frame is a 2 column edgelist, the first column will become the rows and the second column will become the columns. If the data frame is a 3 column edgelist, then the third column will be used as the cell values or tie weights.

Incidence matrices are typically inferred from unequal dimensions, but since in rare cases a matrix with equal dimensions may still be an incidence matrix, an additional argument twomode can be specified to override this heuristic. This information is usually already embedded in {igraph}, {tidygraph}, and {network} objects.

Value

An adjacency or incidence matrix, named if possible.

An igraph graph object.

A tidygraph tbl_graph class object

A sna/network network class object

Examples

```
test <- data.frame(id1 = c("A","B","B","C","C"),
                   id2 = c("I","G","I","G","H"))
as_matrix(test)
test <- data.frame(id1 = c("A","B","B","C","C"),
                   id2 = c("I","G","I","G","H"))
as_igraph(test)
test <- data.frame(id1 = c("A","B","B","C","C"),
                   id2 = c("I","G","I","G","H"))
as_tidygraph(test)
test <- data.frame(id1 = c("A","B","B","C","C"),
                   id2 = c("I","G","I","G","H"))
as_network(test)
```

`create` *Create networks with particular structures*

Description

These functions create a variety of different network objects. Despite the common function names and syntax with existing packages, the common `n` argument can not only be passed a single integer to return a one-mode network, but also a vector of *two* integers to return a two-mode network.

Usage

```
create_empty(n)

create_complete(n)

create_ring(n, width = 1, directed = FALSE, ...)

create_components(n, components = 2)

create_star(n, directed = "in")
```

Arguments

`n`	Number of nodes. If a single integer is given, e.g. `n = 10`, the function will create a one-mode network. If a vector of two integers is given, e.g. `n = c(5,10)`, the function will create a two-mode network.
`width`	The width or breadth of the ring. This is typically double the degree.
`directed`	One of the following options: "in", "out", or "none".
`...`	Additional arguments passed on to igraph.
`components`	Number of components to create.

Details

`create_empty()` creates an empty graph of the given dimensions.

`create_complete()` creates a filled graph of the given dimensions.

`create_ring()` creates a ring or chord graph of the given dimensions that loops around is of a certain width or thickness.

`create_components()` creates a graph in which the nodes are clustered into separate components.

Value

By default an igraph object will be returned, but this can be coerced into other types of objects using `as_matrix()`, `as_tidygraph()`, or `as_network()`.

See Also

as_matrix as_tidygraph as_network

Other creation: `generate`

Examples

```
g <- create_empty(c(8,6))
plot(g)
g <- create_complete(c(8,6))
plot(g)
g <- create_ring(c(8,6), width = 2)
plot(g)
plot(create_components(c(10, 12), components = 3))
plot(create_star(c(12,1)))
```

---

generate *Create networks from particular probabilities*

Description

Create networks from particular probabilities

Usage

```
generate_random(n, p, m)
```

Arguments

`n`	Integer of length 1 or 2.
`p`	Number of edges in the network over the number of edges possible
`m`	Number of edges in the network

Details

Creates a random network. If `length(n)==1`, then a one-mode network will be returned, equivalent to an Erdös-Renyi graph. If `length(n)==1`, then a two-mode network will be returned. The first number is the number of nodes in the first nodeset (rows), and the second number becomes the number of nodes in the second nodeset (columns).

See Also

Other creation: `create`

Examples

```
plot(generate_random(c(10, 12), 0.25))
```

---

graph_clustering *Clustering for one-, two-, and three- mode networks*

Description

This function offers clustering methods for one-, two-, and three-mode networks.

Usage

```
graph_clustering(object, object2 = NULL)
```

Arguments

`object`	A one-mode or two-mode matrix, igraph, or tidygraph
`object2`	Optionally, a second (two-mode) matrix, igraph, or tidygraph

Details

For one-mode networks, the function serves as a shallow wrapper for `igraph::transitivity`, since global transitivity is a regular measure for clustering or local density in one-mode networks.

For two-mode networks, we calculate the proportion of three-paths in the network that are closed by fourth tie to establish a "shared four-cycle" structure.

For three-mode networks, we calculate the proportion of three-paths spanning the two two-mode networks that are closed by a fourth tie to establish a "congruent four-cycle" structure.

References

Robins, Garry L, and Malcolm Alexander. 2004. Small worlds among interlocking directors: Network structure and distance in bipartite graphs. *Computational & Mathematical Organization Theory* 10 (1): 69–94.

Knoke, David, Mario Diani, James Hollway, and Dimitris C Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press. Cambridge University Press.

See Also

Other one-mode measures: node_constraint()

Other two-mode measures: centrality, centralization, node_constraint(), node_smallworld()

Examples

```
graph_clustering(southern_women)
```

---

is *Tests of network properties*

Description

Tests of network properties

Usage

```
is_twomode(object)

is_weighted(object)

is_directed(object)

is_labelled(object)
```

Arguments

object	A migraph-consistent class object (matrix, edgelist, igraph, network, tidygraph)

Value

TRUE if object is a two-mode network, otherwise FALSE

TRUE if object is a weighted network, otherwise FALSE

TRUE if object is a directed network, otherwise FALSE

TRUE if object is a labelled network, otherwise FALSE

Examples

```
is_twomode(southern_women)
is_weighted(southern_women)
is_directed(southern_women)
is_labelled(southern_women)
```

mpn_bristol *Multimodal (3) Bristol protest events, 1990-2002*

Description

A multimodal (3) matrix containing individuals affiliations to civic organizations in Bristol and their participation in major protest and civic events between 1990-2002, and the involvement of the organizations in these events.

Usage

```
data(mpn_bristol)
```

Format

A matrix with 264 rows and columns. Node IDs are prefaced with a type identifier:

1_ 150 Individuals, anonymised

2_ 97 Bristol Civic Organizations

3_ 17 Major Protest and Civic Events in Bristol, 1990-2002

Source

Knoke, David, Mario Diani, James Hollway, and Dimitris C Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press. Cambridge University Press.

mpn_elite_mex *One-mode Mexican power elite database*

Description

A network of 11 core members of the 1990s Mexican power elite (Knoke 2017), three of which were successively elected presidents of Mexico: José López Portillo (1976-82), Miguel de la Madrid (1982-88), and Carlos Salinas de Gortari (1988-94, who was also the son of another core member, Raúl Salinas Lozano). The undirected lines connecting pairs of men represent any formal, informal, or organizational relation between a dyad; for example, "common belonging (school, sports, business, political participation), or a common interest (political power)" (Mendieta et al. 1997: 37).

Usage

```
data(mpn_elite_mex)
```

Format

Matrix with 11 rows/columns

Source

Knoke, David. 1990. *Political Networks*.

Knoke, David, Mario Diani, James Hollway, and Dimitris C Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press. Cambridge University Press.

`mpn_elite_usa_advice` *Two-mode American power elite database*

Description

A 2-mode network of persons serving as directors or trustees of think tanks. Think tanks are "public-policy research analysis and engagement organizations that generate policy-oriented research, analysis, and advice on domestic and international issues, thereby enabling policymakers and the public to make informed decisions about public policy" (McGann 2016: 6). The Power Elite Database (Domhoff 2016) includes information on the directors of 33 prominent think tanks in 2012. Here we include only 14 directors who held three or more seats among 20 think tanks.

Usage

```
data(mpn_elite_usa_advice)
```

Format

Matrix with 14 rows and 20 columns

References

Domhoff, G William. 2016. "Who Rules America? Power Elite Database."

Knoke, David, Mario Diani, James Hollway, and Dimitris C Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press. Cambridge University Press.

`mpn_elite_usa_money` *Three-mode American power elite database*

Description

This data is based on 26 elites who sat on the boards of directors for at least two of six economic policy making organizations (Domhoff 2016), and also made campaign contributions to one or more of six candidates running in the primary election contests for the 2008 Presidential nominations of the Republican Party (Rudy Giuliani, John McCain, Mitt Romney) or the Democratic Party (Hillary Clinton, Christopher Dodd, Barack Obama).

Usage

```
data(mpn_elite_usa_money)
```

Format

Matrix with 26 rows and 6+6 columns

References

Domhoff, G William. 2016. "Who Rules America? Power Elite Database."

The Center for Responsive Politics. 2019. "OpenSecrets."

Knoke, David, Mario Diani, James Hollway, and Dimitris C Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press. Cambridge University Press.

`mpn_evs` *Two-mode European Values Survey, 1990 and 2008*

Description

6 two-mode matrices containing individuals' memberships to 14 different types of associations in three countries (Italy, Germany, and the UK) in 1990 and 2008. The Italy data has 658 respondents in 1990 and 540 in 2008. The Germany data has 1369 respondents in 1990 and 503 in 2008. The UK data has 738 respondents in 1990 and 664 in 2008.

Usage

```
data(mpn_IT_1990)

data(mpn_IT_2008)

data(mpn_DE_1990)

data(mpn_DE_2008)

data(mpn_UK_1990)

data(mpn_UK_2008)
```

Format

Matrices with 14 columns:

Welfare 1 if individual associated

Religious 1 if individual associated

Education.culture 1 if individual associated

Unions 1 if individual associated

Parties 1 if individual associated

Local.political.groups 1 if individual associated

Human.rights 1 if individual associated

Environmental.animal 1 if individual associated

Professional 1 if individual associated

Youth 1 if individual associated

Sports 1 if individual associated

Women 1 if individual associated

Peace 1 if individual associated

Health 1 if individual associated

An object of class `tbl_graph` (inherits from `igraph`) of length 10.

An object of class `tbl_graph` (inherits from `igraph`) of length 10.

An object of class `tbl_graph` (inherits from `igraph`) of length 10.

An object of class `tbl_graph` (inherits from `igraph`) of length 10.

An object of class `tbl_graph` (inherits from `igraph`) of length 10.

Source

Knoke, Diani, Hollway, and Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press: Cambridge.

`mpn_ryanair` *One-mode EU policy influence network, June 2004*

Description

Network of anonymised actors reacting to the Ryanair/Charleroi decision of the EU Commission in February 2004. The relationships mapped comprise an account of public records of interaction supplemented with the cognitive network of key informants. Examination of relevant communiques, public statements and a number of off-the-record interviews provides confidence that the network mapped closely approximated interactions between 29 January and 12 February 2004. The time point mapped is at the height of influence and interest intermediation played by actors in the AER, a comparatively obscure body representing the interests of a number of European regional bodies at the EU institutions.

Usage

```
data(mpn_ryanair)
```

Format

Matrix with 20 rows/columns

Source

Christopoulos, Dimitrios C. 2006. "Relational Attributes of Political Entrepreneurs: a Network Perspective." *Journal of European Public Policy* 13 (5): 757–78.

Knoke, Diani, Hollway, and Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press: Cambridge.

mpn_senate112 *Two-mode 112th Congress Senate Voting*

Description

These datasets list the U.S. Senators who served in the 112th Congress, which met from January 3, 2011 to January 3, 2013. Although the Senate has 100 seats, 103 persons served during this period due to two resignations and a death. However, the third replacement occurred only two days before the end and cast no votes on the bills investigated here. Hence, the number of Senators we analyzed is 102.

Usage

```
data(mpn_DemSxP)

data(mpn_RepSxP)

data(mpn_OverSxP)
```

Format

Matrix of 51 rows (Senators) and 63 columns (PACS)

Matrix of 62 rows (Senators) and 72 columns (PACS)

Matrix of 20 rows (Senators) and 32 columns (PACS)

Details

CQ Almanac identified 25 key bills on which the Senate voted during the 112th Congress, and which Democratic and Republican Senators voting "yea" and "nay" on each proposal.

Lastly, we obtained data on campaign contributions made by 92 PACs from the Open Secrets Website. We recorded all contributions made during the 2008, 2010, and 2012 election campaigns to the 102 persons who were Senators in the 112th Congress. The vast majority of PAC contributions to a candidate during a campaign was for $10,000 (the legal maximum is $5,000 each for a primary and the general election). We aggregated the contributions across all three electoral cycles, then dichotomized the sums into no contribution (0) and any contribution (1).

Source

Knoke, Diani, Hollway, and Christopoulos. 2021. *Multimodal Political Networks*. Cambridge University Press: Cambridge.

`netlm` *Linear regression for multimodal network data*

Description

This function extends the multiple regression quadratic assignment procedure (MRQAP) of network linear model to two mode networks.

Usage

```
netlm(formula, data, ...)

## S3 method for class 'netlm'
summary(object, reps = 1000, ...)

## S3 method for class 'summary.netlm'
print(
  x,
  digits = max(3, getOption("digits") - 3),
  signif.stars = getOption("show.signif.stars"),
  ...
)
```

Arguments

`formula`	A formula describing the relationship being tested.
`data`	A named list of matrices, graphs, or a tidygraph object.
`...`	Arguments passed on to `lm()`.
`object`	an object of class "netlm", usually as a result of a call to `netlm()`.
`reps`	Integer indicating the number of draws to use for quantile estimation. (Relevant to the null hypothesis test only - the analysis itself is unaffected by this parameter.) Note that, as for all Monte Carlo procedures, convergence is slower for more extreme quantiles. By default, reps=1000.
`x`	an object of class "summary.netlm", usually, a result of a call to `summary.netlm()`.
`digits`	the number of significant digits to use when printing.
`signif.stars`	logical. If TRUE, 'significance stars' are printed for each coefficient.

Examples

```
mat1 <- matrix(c(0,1,1,0,0,1,1,1),4,2)
mat2 <- matrix(c(0,1,0,1,0,1,0,1),4,2)
mat3 <- matrix(c(0,0,1,1,0,0,1,1),4,2)
lmat <- list(mat1 = mat1, mat2 = mat2, mat3 = mat3)
model1 <- netlm(mat1 ~ mat2 + mat3, lmat)
summary(model1)
```

node_constraint *Constraint for one- and two-mode networks*

Description

This function measures constraint for both one-mode and two-mode networks. For one-mode networks, the function wraps the implementation of Ron Burt's measure in {igraph}. For two-mode networks, the function employs the extension outlined in Hollway et al. (2020).

Usage

```
node_constraint(object, nodes = V(object), weights = NULL)
```

Arguments

object	A matrix, igraph graph, or tidygraph object.
nodes	The vertices for which the constraint will be calculated. Defaults to all vertices.
weights	The weights of the edges. If this is NULL and there is a weight edge attribute this is used. If there is no such edge attribute all edges will have the same weight.

Value

A named vector (one-mode) or a list of two named vectors ($nodes1, $nodes2).

References

Hollway, James, Jean-Frédéric Morin, and Joost Pauwelyn. 2020. "Structural conditions for novelty: the introduction of new environmental clauses to the trade regime complex." *International Environmental Agreements: Politics, Law and Economics* 20 (1): 61–83.

See Also

Other one-mode measures: graph_clustering()

Other two-mode measures: centrality, centralization, graph_clustering(), node_smallworld()

Other node-level measures: centrality, node_smallworld()

Examples

```
node_constraint(southern_women)
```

node_smallworld *Watts-Strogatz small-world model for two-mode networks*

Description

Calculates small-world metrics for two-mode networks

Usage

```
node_smallworld(object, n = 100)
```

Arguments

object	A matrix, igraph graph, or tidygraph object
n	Number of simulations

Details

The first column of the returned table is simply the number of the second-mode column. The next three columns report the observed and expected clustering, and the ratio of the former to the later. The next three columns report the observed and expected path-length, and the ratio of the former to the later. The last column reports the ratio of the observed/expected clustering ratio to the observed/expected path-length ratio, which is known as a small-world metric. Expected clustering and paths is the mean of twomode_clustering and mean_distance over 100 random simulations with the same row and column sums.

Value

Returns a table of small-world related metrics for each second-mode node.

See Also

graph_clustering for how clustering is calculated

Other two-mode measures: centrality, centralization, graph_clustering(), node_constraint()

Other node-level measures: centrality, node_constraint()

Examples

```
node_smallworld(southern_women)
```

plot.blockmodel *ggplot2-based plotting of blockmodel results*

Description

ggplot2-based plotting of blockmodel results

Usage

```
## S3 method for class 'blockmodel'
plot(x, ...)
```

Arguments

x	A blockmodel-class object.
...	Additional arguments passed on to ggplot2.

Examples

```
usa_concor <- blockmodel_concor(mpn_elite_usa_advice)
plot(usa_concor)
```

plot.igraph *Plotting of one-mode and two-mode graphs*

Description

Plotting of one-mode and two-mode graphs

Usage

```
## S3 method for class 'igraph'
plot(x, ...)
```

Arguments

x	A migraph-compatible object, especially an igraph graph object.
...	Additional arguments passed on to igraph.

Examples

```
mat1 <- create_ring(5,10)
plot(mat1)
```

plot_releases *A plotting function that visualises historical milestones/releases*

Description

The function will take a data frame that details this information, or more usefully, a Github repository listing.

Usage

```
plot_releases(repo)
```

Arguments

repo	the github repository to track, e.g. "snlab-ch/migraph"

Details

The function creates a project timeline graphic using ggplot2 with historical milestones and milestone statuses gathered from a specified GitHub repository.

Value

A ggplot graph object

Source

https://benalexkeen.com/creating-a-timeline-graphic-using-r-and-ggplot2/

Examples

```
if(!httr::http_error("https://api.github.com/repos/snlab-ch/migraph/releases")){
plot_releases("snlab-ch/migraph")
}
```

project *Projecting two-mode objects into one-mode objects*

Description

These functions 'project' or convert a two-mode object in any format – tidygraph, igraph, or matrix – into a corresponding one-mode object.

Usage

```
project_rows(object)

project_cols(object)
```

Arguments

object	A matrix, igraph graph or tidygraph tbl_graph object.

Details

project_rows() results in a weighted one-mode object that retains the row nodes from a two-mode object, and weights the ties between them on the basis of their joint ties to nodes in the second mode (columns).

project_cols() results in a weighted one-mode object that retains the column nodes from a two-mode object, and weights the ties between them on the basis of their joint ties to nodes in the first mode (rows).

Examples

```
project_rows(southern_women)
project_cols(southern_women)
```

---

read *Reading from/writing to external formats*

Description

These functions import from and export to UCINET network files.

Usage

```
read_ucinet(header_file, as = c("igraph", "network", "matrix"))

write_ucinet(
  object,
  filename = deparse(substitute(object)),
  name = deparse(substitute(object))
)
```

Arguments

header_file	A character string giving the path to the header (.##h) file. If the function is called without a header_file specified, an OS-specific file picker is opened to help users select it.
as	An output class. One of "igraph", "network", or "matrix". By default "igraph".
object	A migraph-consistent object to be exported.
filename	UCINET filename (without ## extension). By default the files will have the same name as the object and be saved to the working directory.
name	name of matrix to be known in UCINET. By default the name will be the same as the object.

Details

These functions only work with relatively recent UCINET file formats, e.g. type 6406 files. To import earlier UCINET file types, you will need to update them first.

To import multiple matrices packed into a single UCINET file, you will need to unpack them and convert them one by one.

Value

By default, `read_ucinet()` will import into a matrix format, but can be easily coerced from there into other formats.

A pair of UCINET files in V6404 file format (.##h, .##h)

Author(s)

Christian Steglich, 18 June 2015

See Also

convert

Examples

```
## Not run:
# import Roethlisberger & Dickson's horseplay game data set:
horseplay <- read_ucinet("WIRING-RDGAM.##h")

## End(Not run)
## Not run:
# export it again to UCINET under a different name:
write.ucinet(horseplay,"R&D-horseplay")

## End(Not run)
```

---

southern_women *Two-mode southern women dataset*

Description

Two-mode network dataset collected by Davis, Gardner and Gardner (1941) about women and social events.

Usage

```
data(southern_women)
```

Format

igraph graph object

References

Davis, A., Gardner, B., and Gardner, R. 1941. *Deep South*. Chicago: University of Chicago Press.

`to` *Tools for reformatting networks, graphs, and matrices*

Description

Tools for reformatting networks, graphs, and matrices

Usage

```
to_unweighted(object, threshold = 1)

to_unnamed(object)
```

Arguments

`object`	A matrix, {igraph} graph, {tidygraph} tbl_graph, or {network} object.
`threshold`	For a matrix, the threshold to binarise/dichotomise at.

Examples

```
to_unweighted(project_rows(southern_women))
to_unnamed(project_rows(southern_women))
```

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