

Package ‘networkR’

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Type Package

Title Network Analysis and Visualization

Version 0.1.2

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Description Collection of functions for fast manipulation, handling, and analysis of large-scale networks based on family and social data. Functions are utility functions used to manipulate data in three “formats”: sparse adjacency matrices, pedigree trio family data, and pedigree family data. When possible, the functions should be able to handle millions of data points quickly for use in combination with data from large public national registers and databases. Kenneth Lange (2003, ISBN:978-8181281135).

License GPL (>= 2)

Imports Rcpp (>= 0.12.12), data.table, fastmatch, Matrix

LinkingTo Rcpp, RcppArmadillo

SystemRequirements C++11

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ByteCompile true

RoxygenNote 6.1.1

Suggests testthat

NeedsCompilation yes

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adjacency	<i>Create adjacency matrix</i>
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Description

Create an adjacency matrix from a set of nodes and edges.

Usage

```
adjacency(from, to, weight = 1, directed = TRUE)
```

Arguments

from	a vector of nodes where the edges originate
to	a vector of nodes where the edges point to
weight	a numeric vector of weights
directed	logical. Are the edges directed (TRUE, the default) or bidirected(FALSE).

Value

Returns a sparse adjacency matrix

Author(s)

Claus Ekstrom <ekstrom@sund.ku.dk>

Examples

```
from <- c("A", "A", "A", "B", "C")
to <- c("B", "C", "D", "D", "E")
adjacency(from, to)
```

```
from <- c("A", "A", "A", "B", "C")
to <- c("B", "C", "D", "D", "E")
weights <- c(1, .5, 1, .7, 1)
adjacency(from, to, weights)
```

`hits`*Hyperlink-induced topic search*

Description

Hyperlink-induced topic search (HITS) is a link analysis algorithm that is also known as hubs and authorities. It rates nodes by comparing arrows pointing in and out of nodes in an asymmetrical graph.

Usage

```
hits(adjmatrix, maxiter = 100L, tol = 1e-05)
```

Arguments

<code>adjmatrix</code>	an adjacency matrix
<code>maxiter</code>	non-negative integer
<code>tol</code>	positive numeric value to be used as tolerance threshold for convergence

Details

Hubs are nodes with a lot of arrows pointing out while authorities are node with a lot of arrows pointing in.

Value

Returns a list with three elements: authorities (a vector) of and hubs (a vector), and number of iterations used.

Author(s)

Claus Ekstrom <ekstrom@sund.ku.dk>

References

Kleinberg, Jon (1999). "Authoritative sources in a hyperlinked environment" (PDF). *Journal of the ACM*. 46 (5): 604–632. doi:10.1145/324133.324140

Examples

```
from <- c("A", "A", "A", "B", "C")
to <- c("B", "C", "D", "D", "E")
hits(adjacency(from, to))
```

make_family_id	<i>Construct family id vector from pedigree trio information</i>
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Description

Create a vector of length n , giving the family id of each subject. If the pedigree is totally connected, then everyone will end up in tree 1, otherwise the tree numbers represent the disconnected subfamilies. Singleton subjects each have unique family numbers.

No check is done to ensure that the `id`, `fid`, and `mid` actually refer to proper family structure. References to ids in the `fid` and `mid` arguments that are not part of the `id` vector are considered founders.

Usage

```
make_family_id(id, fid, mid)
```

Arguments

<code>id</code>	Numeric vector of ids
<code>fid</code>	Numeric vector of ids of the father. This should be <code>NA</code> or 0 for a founder.
<code>mid</code>	Numeric vector of ids of the mother. This should be <code>NA</code> or 0 for a founder.

Value

Returns an integer vector giving the family index

Author(s)

Claus Ekstrom <ekstrom@sund.ku.dk>

Examples

```
id <- 1:11
fid <- c(NA, NA, 1, 1, NA, 23, 45, 5, 5, 7, NA)
mid <- c(NA, NA, 2, 2, 65, NA, 46, 6, 6, 6, 0)
make_family_id(id, fid, mid)
```

mksib	<i>Generate variables (or lists) of siblings from a file of ids of persons and their father and mother.</i>
-------	---

Description

The function generates for each person lists of maternal half-sibs, paternal half-sibs and full sibs. Optionally these are expanded to separate columns in a `data.table`.

Usage

```
mksib(obj, ns = 3, expand.vars = TRUE)
```

Arguments

obj	A 3-column structure with column names <code>id</code> , <code>pid</code> (paternal id) and <code>mid</code> (maternal id).
ns	Integer. The maximal no of sibs of each type to include in the result if sibling ids are required in separate columns.
expand.vars	Logical. Should the sibling ids be returned in separate columns. If FALSE they will be returned i three columns of lists.

Details

There are no checks of persons being both mother and father, nor being its own parent and incest checks are not performed. In other words, the `obj` is assumed to be sane, but possibly immoral.

Value

A `data.table` with the columns of the `obj` and columns for `ns` maternal, paternal and full sibs, named `ms1, ms2, ... ps1, ps2, ... fs1, fs2`.

If `expand.vars=FALSE` there will instead be three columns of lists named `msibs, psibs` and `fsibs`.

Author(s)

Claus Thorn Ekstrøm, <ekstrom@sund.ku.dk>, Bendix Carstensen, <b@bxc.dk>

Examples

```
library( data.table )
id <- 1:12
pid <- c(NA, 1, 1, 1, NA, 23, 45, 5, 5, 7, 12, NA)
mid <- c(NA, NA, 2, 2, 12, NA, 46, 6, 6, 6, NA, 12)
indd <- data.table( id, mid, pid )
indata <- copy( indd )
indata
```

```
str( xx <- mksib( indata ) )
xx

zz <- mksib( indata, 2, e=FALSE )
zz
```

networkR

Collection of miscellaneous useful and semi-useful functions

Description

Collection of miscellaneous useful and semi-useful functions and add-on functions that enhances a number of existing packages and provides In particular in relation to statistical genetics

Details

Package: networkR
 Type: Package
 Version: 1.0
 Date: 2012-03-29
 License: GPL-2

how to use the package, including the most important ~~

Author(s)

Claus Thorn Ekstrøm <ekstrom@sund.ku.dk>
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References

Ekstrøm, C. (2017). The R Primer. 2nd edition, Chapman & Hall.

validate_trio_consistency

Validate pedigree trio information consistency

Description

Simple tests to check the consistency of the pedigree trio family data. Currently the following checks are undertaken: 1) that no duplicates ids are found; 2) that the primary id is not missing for anyone; 3) that founders have both the father and mother id missing; 4) that individuals are not both classified as male (fathers and mothers);

Usage

```
validate_trio_consistency(id, fid, mid, sex = NULL)
```

Arguments

id	Numeric. The id of the individual. These values should be unique
fid	Numeric. The father id. NA or 0 are used for missing.
mid	Numeric. The mother id. NA or 0 are used for missing.
sex	An optional numeric vector with the sex of the individual. Only four values should be present 1 (male), 2 (female), 0 or NA (missing)

Details

There are no checks of persons being both mother and father, nor being its own parent and incest checks are not performed. In other words, the obj is assumed to be sane, but possibly immoral.

Value

Throws an error if an inconsistency is found. Otherwise returns TRUE.

Author(s)

Claus Thorn Ekstrøm, <ekstrom@sund.ku.dk>

Examples

```
library("data.table")
id <- 1:12
fid <- c(NA, 0, 1, 1, NA, 23, 45, 5, 5, 7, 10, 10)
mid <- c(NA, NA, 2, 2, 0, 56, 46, 6, 6, 6, 9, 11)

validate_trio_consistency(id, fid, mid)
```

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