Package ‘assortnet’

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Type Package

Title Calculate the Assortativity Coefficient of Weighted and Binary Networks

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Description Functions to calculate the assortment of vertices in social networks. This can be measured on both weighted and binary networks, with discrete or continuous vertex values.

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`assortnet-package` *Calculate the assortativity coefficient of weighted and binary networks ~~ assortnet ~~*

Description

Functions to calculate the assortment of vertices in social networks. This can be measured on both weighted and binary networks, with discrete or continuous vertex values.

Details

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Author(s)

Maintainer: Damien Farine <dfarine@orn.mpg.de>

References

Newman (2003) Mixing patterns in networks. Physical Review E (67) Farine, D.R. (2014) Measuring phenotypic assortment in animal social networks: weighted associations are more robust than binary edges. Animal Behaviour 89: 141-153.

`assortment.continuous` *Assortment on continuous vertex values*

Description

Calculates the assortativity coefficient for weighted and unweighted graphs with numerical vertex values

Usage

```
assortment.continuous(graph, vertex_values, weighted = TRUE, SE = FALSE, M = 1)
```

Arguments

`graph`	A Adjacency matrix, as an N x N matrix. Can be weighted or binary.
`vertex_values`	Values on which to calculate assortment, vector of N numbers
`weighted`	Flag: TRUE to use weighted edges, FALSE to turn edges into binary (even if weights are given)
`SE`	Calculate standard error using the Jackknife method.
`M`	Binning value for Jackknife, where M edges are removed rather than single edges. This helps speed up the estimate for large networks with many edges.

Value

This function returns a named list, with two elements:

$r the assortativity coefficient $SE the standard error

Author(s)

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References

Newman (2003) Mixing patterns in networks. Physical Review E (67) Farine, D.R. (2014) Measuring phenotypic assortment in animal social networks: weighted associations are more robust than binary edges. Animal Behaviour 89: 141-153.

Examples

```
# DIRECTED NETWORK EXAMPLE
# Create a random directed network
N <- 20
dyads <- expand.grid(ID1=1:20,ID2=1:20)
dyads <- dyads[which(dyads$ID1 != dyads$ID2),]
weights <- rbeta(nrow(dyads),1,15)
network <- matrix(0, nrow=N, ncol=N)
network[cbind(dyads$ID1,dyads$ID2)] <- weights

# Create random continues trait values
traits <- rnorm(N)

# Test for assortment as binary network
assortment.continuous(network,traits,weighted=FALSE)

# Test for assortment as weighted network
assortment.continuous(network,traits,weighted=TRUE)



# UNDIRECTED NETWORK EXAMPLE
# Create a random undirected network
N <- 20
dyads <- expand.grid(ID1=1:20,ID2=1:20)
dyads <- dyads[which(dyads$ID1 < dyads$ID2),]
weights <- rbeta(nrow(dyads),1,15)
network <- matrix(0, nrow=N, ncol=N)
network[cbind(dyads$ID1,dyads$ID2)] <- weights
network[cbind(dyads$ID2,dyads$ID1)] <- weights

# Create random continues trait values
traits <- rnorm(N)

# Test for assortment as binary network
assortment.continuous(network,traits,weighted=FALSE)

# Test for assortment as weighted network
assortment.continuous(network,traits,weighted=TRUE)
```

assortment.discrete *Assortment on discrete vertex values*

Description

Calculates the assortativity coefficient for weighted and unweighted graphs with nominal/categorical vertex values

Usage

```
assortment.discrete(graph, types, weighted = TRUE, SE = FALSE, M = 1)
```

Arguments

graph	Adjacency matrix, as an N x N matrix. Can be weighted or binary.
types	Values on which to calculate assortment, vector of N labels
weighted	Flag: TRUE to use weighted edges, FALSE to turn edges into binary (even if weights are given)
SE	Calculate standard error using the Jackknife method.
M	Binning value for Jackknife, where M edges are removed rather than single edges. This helps speed up the estimate for large networks with many edges.

Value

This function returns a named list, with three elements:

$r the assortativity coefficient $SE the standard error $mixing_matrix the mixing matrix with the distribution of edges or edge weights by category

Author(s)

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References

Newman (2003) Mixing patterns in networks. Physical Review E (67) Farine, D.R. (2014) Measuring phenotypic assortment in animal social networks: weighted associations are more robust than binary edges. Animal Behaviour 89: 141-153.

Examples

```
# DIRECTED NETWORK EXAMPLE
# Create a random directed network
N <- 20
dyads <- expand.grid(ID1=1:20,ID2=1:20)
dyads <- dyads[which(dyads$ID1 != dyads$ID2),]
weights <- rbeta(nrow(dyads),1,15)
network <- matrix(0, nrow=N, ncol=N)
```

```
network[cbind(dyads$ID1,dyads$ID2)] <- weights

# Create random discrete trait values
traits <- rpois(N,2)

# Test for assortment as binary network
assortment.discrete(network,traits,weighted=FALSE)

# Test for assortment as weighted network
assortment.discrete(network,traits,weighted=TRUE)



# UNDIRECTED NETWORK EXAMPLE
# Create a random undirected network
N <- 20
dyads <- expand.grid(ID1=1:20,ID2=1:20)
dyads <- dyads[which(dyads$ID1 < dyads$ID2),]
weights <- rbeta(nrow(dyads),1,15)
network <- matrix(0, nrow=N, ncol=N)
network[cbind(dyads$ID1,dyads$ID2)] <- weights
network[cbind(dyads$ID2,dyads$ID1)] <- weights

# Create random discrete trait values
traits <- rpois(N,2)

# Test for assortment as binary network
assortment.discrete(network,traits,weighted=FALSE)

# Test for assortment as weighted network
assortment.discrete(network,traits,weighted=TRUE)
```

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