Package ‘netglm’

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Type Package

Title netglm - generalized linear models for network data

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Author Timon Elmer

Maintainer Timon Elmer <timon.elmer@gmail.com>

Description Estimates generalized linear models for network data based on the Quadratic Assignment Procedure (Krackhardt, 1988). This package allows to investigate associations between characteristics of dyads in networks (e.g., the level of homophily between two actors) and a binary or continuous tie variable (e.g., friendship, amount of time spent together). One unique feature of this package is that it allows to estimate multi-group QAP models, where multiple networks are analyzed simultaneously (e.g., networks of multiple classrooms). Furthermore, parallel processing is implemented.

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Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Suggests testthat

Imports ggplot2

R topics documented:

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QAP	<i>MRQAP for unnested data</i>
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Description

Estimates a Multiple Regression Quadratic Assignment Procedure model (MRQAP; Krackhardt, 1988). MRQAPs allow investigating associations between characteristics of dyads in networks (e.g., the level of homophily between two actors) and a binary or continuous tie variable (e.g., friendship, amount of time spent together).

Usage

```
QAP(dv, iv1, iv.names, mode = "yQAP", samples = 1000, diag = F, directed = F)
```

Arguments

<code>dv</code>	a matrix with $n * m$ dimensions and cells indicating the presence of a tie (1 = tie, 0 = no tie for binary variables) or the weight of a tie (for continuous tie variables) characterizing the dependent variable
<code>iv1</code>	a list of matrices with $n * m$ dimensions characterizing the independent variables
<code>iv.names</code>	names of the independent variables for the output object
<code>mode</code>	permutation method to be applied. default is "yQAP" for permuting the Y / dv variables. "dspQAP" applies Dekker's semi partialing method (Dekker, Krackhardt, & Snijders, 2007)
<code>samples</code>	number of permutations, default is 1000.
<code>diag</code>	boolean for using the diagonal values of matrices in the estimation. default is FALSE
<code>directed</code>	"directed" if the dependent network is directed (ties from A to B and B to A are possible), "undirected" if the dependent network is undirected (ties from A to B are identical to B to A). Default is "directed".
<code>iv.list.per</code>	lists in the ivs argument are should be nested by group and independent matrices, if this is not the case (grouped by independent matrices and then groups) the argument <code>iv.list.per = "iv"</code> can be used to restructure the data.
<code>family</code>	family of the generalized linear model. default is "gaussian" for continuous dependent variables. F or binomial dependent variables "binomial" is advised.
<code>round.to</code>	numeric, number of digits in output table
<code>cpu</code>	number of cpu's to be used for estimation, default is 1
<code>logfilename</code>	name of log file printing intermediate reports during the estimation procedure.
<code>verbose</code>	reports of what is happening under the hood during the call of the function, default is TRUE
<code>global.deltas</code>	during "dspQAP" estimation, should global or local delta values be used. default is TRUE
<code>return.perms</code>	should permuted networks be part of the output? default is FALSE

References

- Dekker, D.; Krackhardt, D.; Snijders, T.A.B. (2007). "Sensitivity of MRQAP Tests to Collinearity and Autocorrelation Conditions." *Psychometrika*, 72(4), 563-581.
- Krackhardt, D. (1987). "QAP Partialling as a Test of Spuriousness." *Social Networks*, 9 171-186.
- Krackhardt, D. (1988). "Predicting With Networks: Nonparametric Multiple Regression Analyses of Dyadic Data." *Social Networks*, 10, 359-382.

See Also

[QAP.MG](#)

Examples

```
# create test data #
inspired by the example funciton in sna::netlm
ivnet1<-sna::rgraph(20,4)

dv1<-ivnet1[1,,]+4*ivnet1[2,,]+2*ivnet1[3,,] # Note that the fourth graph is unrelated
dv1 <- dv1 + rnorm(400,mean = 1, sd = 1)
iv1 <- list(ivnet1[1,,],ivnet1[2,,],ivnet1[3,,], ivnet1[4,,])
QAP.MG(list(dv1), list(iv1), iv.names = c("intercept",paste0("IV",1:4)), samples = 3000)
```

QAP.MG

Multigroup MRQAP

Description

Estimates a MRQAP model taking the multilevel/grouped nature of the into account. An application and detailed description of the multigroup extension of MRQAP can be found in Elmer and Stadtfeld (2020).

Usage

```
QAP.MG(
  dvs,
  ivs,
  iv.list.per = "group",
  family = "gaussian",
  iv.names = iv.names,
  mode = "yQAP",
  samples = 1000,
  diag = F,
  directed = T,
  cpu = 1,
  round.to = 5,
  logfilename = "QAP.log",
  verbose = T,
  global.deltas = T,
  return.perms = F
)
```

Arguments

dvs	a list of matrices where each matrix represents the dependent network of one group. Cells of the matrix indicating the presence of a tie (1 = tie, 0 = no tie for binary variables) or the weight of a tie (for continuous tie variables) characterizing the dependent networks
ivs	a list of lists with where each sets of independent matrices are grouped by group and then independent variables. If the list is organized per independent network the argument iv.list.per = "iv" can be used to restructure the data.
iv.list.per	lists in the ivs argument are should be nested by group and independent matrices, if this is not the case (grouped by independent matrices and then groups) the argument iv.list.per = "iv" can be used to restructure the data.

family	family of the generalized linear model. default is "gaussian" for continuous dependent variables. F or binomial dependent variables "binomial" is advised.
iv.names	names of the independent variables for the output object
mode	permutation method to be applied. default is "yQAP" for permuting the Y / dv variables. "dspQAP" applies Dekker's semi partialing method (Dekker, Krackhardt, & Snijders, 2007)
samples	number of permutations, default is 1000.
diag	boolean for using the diagonal values of matrices in the estimation. default is FALSE
directed	"directed" if the dependent network is directed (ties from A to B and B to A are possible), "undirected" if the dependent network is undirected (ties from A to B are identical to B to A). Default is "directed".
cpu	number of cpu's to be used for estimation, default is 1
round.to	numeric, number of digits in output table
logfilename	name of log file printing intermediate reports during the estimation procedure.
verbose	reports of what is happening under the hood during the call of the function, default is TRUE
global.deltas	during "dspQAP" estimation, should global or local delta values be used. default is TRUE
return.perms	should permuted networks be part of the output? default is FALSE

References

- Dekker, D., Krackhardt, D., & Snijders, T.A.B. (2007). "Sensitivity of MRQAP Tests to Collinearity and Autocorrelation Conditions." *Psychometrika*, 72(4), 563-581.
- Elmer, T., & Stadtfeld, C. (2020). "Depressive symptoms are associated with social isolation in face-to-face interaction networks". *Scientific Reports*, 1–12. <https://doi.org/10.1038/s41598-020-58297-9>
- Krackhardt, D. (1987). "QAP Partialling as a Test of Spuriousness." *Social Networks*, 9 171-186.
- Krackhardt, D. (1988). "Predicting With Networks: Nonparametric Multiple Regression Analyses of Dyadic Data." *Social Networks*, 10, 359-382.

See Also

[QAP](#)

Examples

```
# create test data #
inspired by the example function in sna::netlm
ivnet1<-sna::rgraph(20,4)
ivnet2<-sna::rgraph(20,4)

dv1<-ivnet1[1,,]+4*ivnet1[2,,]+2*ivnet1[3,,] # Note that the fourth graph is unrelated
dv1 <- dv1 + rnorm(400,mean = 1, sd = 1)

dv2 <- 2*ivnet2[1,,]+3*ivnet2[2,,]+3*ivnet2[3,,]
dv2 <- dv2 + rnorm(400,mean = 1, sd = 1)
dvs <- list(dv1, dv2)
iv1 <- list(ivnet1[1,,],ivnet1[2,,],ivnet1[3,,], ivnet1[4,,])
```

```
iv2 <- list(ivnet2[1,,],ivnet2[2,,],ivnet2[3,,], ivnet2[4,,])
ivs <- list(iv1, iv2)
iv.names = c("intercept",paste0("IV",1:4))
QAP.MG(dvs, ivs, iv.names = c("intercept",paste0("IV",1:4)), samples = 3000)
```

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