 Package ‘hergm’

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bali

*Bali terrorist network*

**Description**

The network corresponds to the contacts between the 17 terrorists who carried out the bombing in Bali, Indonesia in 2002. The network is taken from Koschade (2006).

**Usage**

```
data(bali)
```

**Value**

Undirected network.

**References**


**See Also**

`network`, `hergm`, `ergm.terms`, `hergm.terms`

---

bunt

*Van de Bunt friendship network*

**Description**

Van de Bunt (1999) and Van de Bunt et al. (1999) collected data on friendships between 32 freshmen at a European university at 7 time points. Here, the last time point is used. A directed edge from student i to j indicates that student i considers student j to be a “friend” or “best friend”.
example

Usage

data(bunt)

Value

Directed network.

References


See Also

network, hergm, ergm.terms, hergm.terms

Example network

Description

Example data set: synthetic, undirected network with 15 nodes.

Usage

data(example)

Value

Undirected network.

References


See Also

network, hergm, ergm.terms, hergm.terms
gof.hergm

Goodness-of-fit

description

The function gof.hergm accepts an object of class hergm as argument and assesses the goodness-of-fit of the model estimated by function hergm.

Usage

## S3 method for class 'hergm'
gof(object, sample_size = 1000, ...)

Arguments

- **object**: object of class hergm; objects of class hergm can be generated by function hergm.
- **sample_size**: number of samples to generate.
- **...**: additional arguments, to be passed to lower-level functions in the future.

Value

The function gof.hergm returns a list with components:

- **component.number**: number of components.
- **max.component.size**: size of largest component.
- **distance**: geodesic distance of pairs of nodes.
- **degree**: degree of nodes.
- **edges**: number of edges.
- **stars**: number of 2-stars.
- **triangle**: number of triangles.

References


See Also

hergm, simulate.hergm
Hierarchical exponential-family random graph models with local dependence

Description

The function `hergm` estimates and simulates three classes of hierarchical exponential-family random graph models:

1. The p_1 model of Holland and Leinhardt (1981) in exponential-family form and extensions by Vu, Hunter, and Schweinberger (2013) and Schweinberger, Petrescu-Prahova, and Vu (2014) to both directed and undirected random graphs with additional model terms, with and without covariates, and with parametric and nonparametric priors (see `arcs_i`, `arcs_j`, `edges_i`, `edges_ij`, `mutual_i`, `mutual_ij`).

2. The stochastic block model of Snijders and Nowicki (1997) and Nowicki and Snijders (2001) in exponential-family form and extensions by Vu, Hunter, and Schweinberger (2013) and Schweinberger, Petrescu-Prahova, and Vu (2014) with additional model terms, with and without covariates, and with parametric and nonparametric priors (see `arcs_i`, `arcs_j`, `edges_i`, `edges_ij`, `mutual_i`, `mutual_ij`).

3. The exponential-family random graph models with local dependence of Schweinberger and Handcock (2015), with and without covariates, and with parametric and nonparametric priors (see `arcs_i`, `arcs_j`, `edges_i`, `edges_ij`, `mutual_i`, `mutual_ij`, `twostar_ijk`, `triangle_ijk`, `ttriple_ijk`, `ctriple_ijk`). The exponential-family random graph models with local dependence replace the long-range dependence of conventional exponential-family random graph models by short-range dependence. Therefore, exponential-family random graph models with local dependence replace the strong dependence of conventional exponential-family random graph models by weak dependence, reducing the problem of model degeneracy (Handcock, 2003; Schweinberger, 2011) and improving goodness-of-fit (Schweinberger and Handcock, 2015). In addition, exponential-family random graph models with local dependence satisfy a weak form of self-consistency in the sense that these models are self-consistent under neighborhood sampling (Schweinberger and Handcock, 2015), which enables consistent estimation of neighborhood-dependent parameters (Schweinberger and Stewart, 2017; Schweinberger, 2017).

Usage

```r
hergm(formula, 
  max_number = 2, 
  hierarchical = TRUE, 
  parametric = FALSE, 
  parameterization = "offset", 
  initialize = FALSE, 
  initialization_method = 1, 
  estimate_parameters = TRUE, 
  initial_estimate = NULL, 
  n_em_step_max = 100, 
  max_iter = 4,
```

perturb = FALSE,
scaling = NULL,
alpha = NULL,
alpha_shape = NULL,
alpha_rate = NULL,
et = NULL,
et_mean = NULL,
et_sd = NULL,
et_mean_mean = NULL,
et_mean_sd = NULL,
et_precision_shape = NULL,
et_precision_rate = NULL,
mean_between = NULL,
indicator = NULL,
parallel = 1,
simulate = FALSE,
method = "ml",
seeds = NULL,
sample_size = NULL,
sample_size_multiplier_blocks = 20,
NR_max_iter = 200,
NR_step_len = NULL,
NR_step_len_multiplier = 0.2,
interval = 1024,
burnin = 16*interval,
mh.scale = 0.25,
variational = FALSE,
temperature = c(1,100),
predictions = FALSE,
posterior.burnin = 2000,
posterior.thinning = 1,
relabel = 1,
number_runs = 1,
verbose = 0,
...)

Arguments

formula formula of the form network ~ terms. network is an object of class network and can be created by calling the function network. Possible terms can be found in ergm.terms and hergm.terms.

max_number maximum number of blocks.
hierarchical hierarchical prior; if hierarchical = TRUE, prior is hierarchical (i.e., the means and variances of block parameters are governed by a hyper-prior), otherwise non-hierarchical (i.e., the means and variances of block parameters are fixed).

parametric parametric prior; if parametric = FALSE, prior is truncated Dirichlet process prior, otherwise parametric Dirichlet prior.
There are three possible parameterizations of within-block terms when using method == "ml". Please note that between-block terms do not use these parameterizations, and method == "bayes" allows the parameters of all within-block terms to vary across blocks and hence does not use them either.

- **standard**: The parameters of all within-block terms are constant across blocks.
- **offset**: The offset \( \log(n[k]) \) is subtracted from the parameters of the within-block edge terms and is added to the parameters of the within-block mutual edge terms along the lines of Krivitsky, Handcock, and Morris (2011), Krivitsky and Kolaczyk (2015), and Stewart, Schweinberger, Bojanowski, and Morris (2019), where \( n[k] \) is the number of nodes in block \( k \). The parameters of all other within-block terms are constant across blocks.
- **size**: The parameters of all within-block terms are multiplied by \( \log(n[k]) \) along the lines of Babkin et al. (2020), where \( n[k] \) is the number of nodes in block \( k \).

**initialize** if initialize = TRUE, initialize block memberships of nodes.

**initialization_method**
if initialization_method = 1, block memberships of nodes are initialized by walk trap; if initialization_method = 2, block memberships of nodes are initialized by spectral clustering.

**estimate_parameters**
if method = "ml" and estimate_parameters = TRUE, estimate parameters.

**initial_estimate**
if method = "ml" and estimate_parameters = TRUE, specifies starting point.

**n_em_step_max** if method = "ml", maximum number of iterations of Generalized Expectation Maximization algorithm estimating the block structure.

**max_iter** if method = "ml", maximum number of iterations of Monte Carlo maximization algorithm estimating parameters given block structure.

**perturb** if initialize = TRUE and perturb = TRUE, initialize block memberships of nodes by spectral clustering and perturb.

**scaling** if scaling = TRUE, use size-dependent parameterizations which ensure that the scaling of between- and within-block terms is consistent with sparse edge terms.

**alpha** concentration parameter of truncated Dirichlet process prior of natural parameters of exponential-family model.

**alpha_shape, alpha_rate** shape and rate parameter of Gamma prior of concentration parameter.

**eta** the parameters of \texttt{ergm.terms} and \texttt{hergm.terms}; the parameters of \texttt{hergm.terms} must consist of \texttt{max_number} within-block parameters and one between-block parameter.

**eta_mean, eta_sd** means and standard deviations of Gaussian baseline distribution of Dirichlet process prior of natural parameters.

**eta_mean_mean, eta_mean_sd** means and standard deviations of Gaussian prior of mean of Gaussian baseline distribution of Dirichlet process prior.
eta_precision_shape, eta_precision_rate
shape and rate (inverse scale) parameter of Gamma prior of precision parameter of Gaussian baseline distribution of Dirichlet process prior.

mean_between if simulate = TRUE and eta = NULL, then mean_between specifies the mean-value parameter of edges between blocks.

indicator if the indicators of block memberships of nodes are specified as integers between 1 and max_number, the specified indicators are fixed, which is useful when indicators of block memberships are observed (e.g., in multilevel networks).

parallel number of computing nodes; if parallel > 1, hergm is run on parallel computing nodes.

simulate if simulate = TRUE, simulate networks from model, otherwise estimate model given observed network.

method if method = "bayes", Bayesian methods along the lines of Schweinberger and Handcock (2015) and Schweinberger and Luna (2018) are used; otherwise, if method = "ml", then approximate maximum likelihood methods along the lines of Babkin et al. (2020) are used; note that Bayesian methods are the gold standard but are too time-consuming to be applied to networks with more than 100 nodes, whereas the approximate maximum likelihood methods can be applied to networks with thousands of nodes.

seeds seed of pseudo-random number generator; if parallel > 1, number of seeds must equal number of computing nodes.

sample_size if simulate = TRUE, number of network draws, otherwise number of posterior draws; if parallel > 1, number of draws on each computing node.

sample_size_multiplier_blocks if method = "ml", multiplier of the number of network draws from within-block subgraphs; the total number of network draws from within-block subgraphs is sample_size_multiplier_blocks * number of possible edges of largest within-block subgraph; if sample_size_multiplier_blocks = NULL, then total number of network draws from within-block subgraphs is sample_size.

NR_max_iter if method = "ml", the maximum number of iterations to be used in the estimation of parameters.

NR_step_len if method = "ml", the step-length to be used for increments in the estimation of parameters. If set to NULL (default), then an adaptive step length procedure is used.

NR_step_len_multiplier if method = "ml", multiplier for adjusting the step-length in the estimation procedure after a divergent increment.

interval if simulate = TRUE, number of proposals between sampled networks.

burnin if simulate = TRUE, number of burn-in iterations.

mh.scale if simulate = FALSE, scale factor of candidate-generating distribution of Metropolis-Hastings algorithm.

variational if simulate = FALSE and variational = TRUE, variational methods are used to construct the proposal distributions of block memberships of nodes; limited to selected models.
temperature  if simulate = FALSE and variational = TRUE, minimum and maximum temperature; the temperature is used to melt down the proposal distributions of indicators, which are based on the full conditional distributions of indicators but can have low entropy, resulting in slow mixing of the Markov chain; the temperature is a function of the entropy of the full conditional distributions and is designed to increase the entropy of the proposal distributions, and the minimum and maximum temperature are user-defined lower and upper bounds on the temperature.

predictions  if predictions = TRUE and simulate = FALSE, returns posterior predictions of statistics in the model.

posterior.burnin  number of posterior burn-in iterations; if computing is parallel, posterior.burnin is applied to the sample generated by each processor; please note that hergm returns min(sample_size, 10000) sample points and the burn-in is applied to the sample of size min(sample_size, 10000), therefore posterior.burnin should be smaller than min(sample_size, 10000).

posterior.thinning  if posterior.thinning > 1, every posterior.thinning-th sample point is used while all others discarded; if computing is parallel, posterior.thinning is applied to the sample generated by each processor; please note that hergm returns min(sample_size, 10000) sample points and the thinning is applied to the sample of size min(sample_size, 10000) - posterior.burnin, therefore posterior.thinning should be smaller than min(sample_size, 10000) - posterior.burnin.

relabel  if relabel > 0, relabel MCMC sample by minimizing the posterior expected loss of Schweinberger and Handcock (2015) (relabel = 1) or Peng and Carvalho (2016) (relabel = 2).

number_runs  if relabel = 1, number of runs of relabeling algorithm.

verbose  if verbose = -1, no console output; if verbose = 0, short console output; if verbose = +1, long console output. If, e.g., simulate = FALSE and verbose = 1, then hergm reports the following console output:

Progress: 50.00% of 1000000

... means of block parameters: -0.2838 1.3323 precisions of block parameters: 0.9234 1.4682 block parameters:
-0.2544 -0.2560 -0.1176 -0.0310 -0.1915 -1.9626
0.4022 1.8887 1.9719 0.6499 1.7265 0.0000 block indicators: 1 3 1 1 1 1 3 1 1 2 2 2 2 2 1 1 1 block sizes: 10 5 2 0 0 block probabilities: 0.5396 0.2742 0.1419 0.0423 0.0020 block probabilities prior parameter: 0.4256 posterior prediction of statistics: 66 123

where ... indicates additional information about the Markov chain Monte Carlo algorithm that is omitted here. The console output corresponds to:

- "means of block parameters" correspond to the mean parameters of the Gaussian base distribution of parameters of hergm-terms.
- "precisions of block parameters" correspond to the precision parameters of the Gaussian base distribution of parameters of \texttt{hergm}-terms.
- "block parameters" correspond to the parameters of \texttt{hergm}-terms.
- "block indicators" correspond to the indicators of block memberships of nodes.
- "block sizes" correspond to the block sizes.
- "block probabilities" correspond to the prior probabilities of block memberships of nodes.
- "block probabilities prior parameter" corresponds to the concentration parameter of truncated Dirichlet process prior of parameters of \texttt{hergm}-terms.
- if \texttt{predictions = TRUE}, "posterior prediction of statistics" correspond to posterior predictions of sufficient statistics.

... additional arguments, to be passed to lower-level functions in the future.

Value

The function \texttt{hergm} returns an object of class \texttt{hergm} with components:

- \texttt{network} is an object of class \texttt{network} and can be created by calling the function \texttt{network}.
- \texttt{formula} of the form \texttt{network ~ terms}. \texttt{network} is an object of class \texttt{network} and can be created by calling the function \texttt{network}. Possible terms can be found in \texttt{ergm.terms} and \texttt{hergm.terms}.
- \texttt{n} number of nodes.
- \texttt{hyper_prior} indicator of whether hyper prior has been specified, i.e., whether the parameters \texttt{alpha}, \texttt{eta_mean}, and \texttt{eta_precision} are estimated.
- \texttt{alpha} concentration parameter of truncated Dirichlet process prior of parameters of \texttt{hergm}-terms.
- \texttt{ergm_theta} parameters of \texttt{ergm}-terms.
- \texttt{eta_mean} mean parameters of Gaussian base distribution of parameters of \texttt{hergm}-terms.
- \texttt{eta_precision} precision parameters of Gaussian base distribution of parameters of \texttt{hergm}-terms.
- \texttt{d1} total number of parameters of \texttt{ergm} terms.
- \texttt{d2} total number of parameters of \texttt{hergm} terms.
- \texttt{hergm_theta} parameters of \texttt{hergm}-terms.
- \texttt{relabeled.hergm_theta} relabeled parameters of \texttt{hergm}-terms by using \texttt{relabel = 1} or \texttt{relabel = 2}.
- \texttt{number_fixed} number of fixed indicators of block memberships of nodes.
- \texttt{indicator} indicators of block memberships of nodes.
- \texttt{relabel} if \texttt{relabel > 0}, relabel MCMC sample by minimizing the posterior expected loss of \citet{SchweinbergerHandcock2015} (\texttt{relabel = 1}) or \citet{PengCarvalho2016} (\texttt{relabel = 2}).
- \texttt{relabeled.indicator} relabeled indicators of block memberships of nodes by using \texttt{relabel = 1} or \texttt{relabel = 2}. 
size: the size of the blocks, i.e., the number of nodes of blocks.

parallel: number of computing nodes; if parallel > 1, hergm is run on parallel computing nodes.

p.i.k: posterior probabilities of block membership of nodes.

c_k: probabilities of block memberships of nodes.

predictions: if predictions = TRUE and simulate = FALSE, returns posterior predictions of statistics in the model.

simulate: if simulate = TRUE, simulation of networks, otherwise Bayesian inference.

c_prediction: posterior predictions of statistics.

edgelist: edge list of simulated network.

c_sample_size: if simulate = TRUE, number of network draws, otherwise number of posterior draws minus number of burn-in iterations; if parallel > 1, number of draws on each computing node.

extract: indicator of whether function hergm.postprocess has postprocessed the object of class hergm generated by function hergm and thus whether the MCMC sample generated by function hergm has been extracted from the object of class hergm.

convergence.diagnostics: MCMC diagnostics generated by function mcmc.diagnostics, which in turn relies on function mcgibbsit in R package mcgibbsit; see ?mcgibbsit.

verbose: if verbose = -1, no console output; if verbose = 0, short console output; if verbose = +1, long console output.

References


See Also

network, ergm.terms, hergm.terms, hergm.postprocess, mcmc.diagnostics, summary, print, plot, gof, simulate

Examples

data(example)
m <- summary(d ~ edges)

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<th>Model terms</th>
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Description

Hierarchical exponential-family random graph models with local dependence can be specified by calling the function `hergm(formula)`, where formula is a formula of the form `network ~ terms`. By specifying suitable terms, it is possible to specify a wide range of models: see `hergm`. `hergm.terms` can be found here. In addition, `ergm.terms` can be used to include covariates.
Arguments
edges_i (undirected network)
  adding the term edges_i to the model adds node-dependent edge terms to the model; please note: the term edges_i can be used with method = "bayes" but cannot be used with the default method = "ml".

arcs_i (directed network)
  adding the term arcs_i to the model adds node-dependent outdegree terms to the model; please note: the term arcs_i can be used with method = "bayes" but cannot be used with the default method = "ml".

arcs_j (directed network)
  adding the term arcs_j to the model adds node-dependent indegree terms to the model; please note: the term arcs_j can be used with method = "bayes" but cannot be used with the default method = "ml".

edges_ij (undirected, directed network)
  adding the term edges_ij to the model adds block-dependent edge terms to the model.

mutual_i (directed network)
  adding the term mutual_i to the model adds additive, block-dependent mutual edge terms to the model.

mutual_ij (directed network)
  adding the term mutual_ij to the model adds block-dependent mutual edge terms to the model.

twostar_ijk (undirected network)
  adding the term twostar_ijk to the model adds block-dependent two-star terms to the model;

transitiveties_ijk (directed network)
  adding the term transitiveties_ijk to the model adds block-dependent transitive ties terms to the model.

triangle_ijk (undirected, directed network)
  adding the term triangle_ijk to the model adds block-dependent triangle terms to the model.

ttriple_ijk (directed network)
  adding the term ttriple_ijk to the model adds block-dependent transitive triple terms to the model; please note: the term ttriple_ijk can be used with method = "bayes" but cannot be used with the default method = "ml".

ctriple_ijk (directed network)
  adding the term ctriple_ijk to the model adds block-dependent cyclic triple terms to the model; please note: the term ctriple_ijk can be used with method = "bayes" but cannot be used with the default method = "ml".

References

See Also
hergm, ergm.terms
**hergm.postprocess**

**Postprocess object of class hergm**

**Description**

The function `hergm.postprocess` postprocesses an object of class `hergm`. Please note that the function `hergm` calls the function `hergm.postprocess` with `relabel = 0` by default or with other values of `relabel` specified by the user, therefore users do not need to call the function `hergm.postprocess` unless it is desired to postprocess an object of class `hergm` with a value of `relabel` that was not used by function `hergm`.

If `hergm.postprocess` is called with `relabel > 0`, it solves the so-called label-switching problem. The label-switching problem is rooted in the invariance of the likelihood function to permutations of the labels of blocks, and implies that raw MCMC samples from the posterior cannot be used to infer to block-dependent entities. The label-switching problem can be solved in a Bayesian decision-theoretic framework: by choosing a loss function and minimizing the posterior expected loss. Two loss functions are implemented in `hergm.postprocess`, the loss function of Schweinberger and Handcock (2015) (`relabel == 1`) and the loss function of Peng and Carvalho (2016) (`relabel == 2`). The first loss function seems to be superior in terms of the reported clustering probabilities, but is more expensive in terms of computing time. A rule of thumb is to use the first loss function when `max_number < 15` and use the second loss function otherwise.

**Usage**

```r
hergm.postprocess(object,
                   burnin = 2000,
                   thinning = 1,
                   relabel = 1,
                   number_runs = 1,
                   ...)
```

**Arguments**

- `object` object of class `hergm`; objects of class `hergm` can be generated by function `hergm`.
- `burnin` number of posterior burn-in iterations; if computing is parallel, `burnin` is applied to the sample generated by each processor; please note that `hergm` returns `min(sample_size, 10000)` sample points and the burn-in is applied to the sample of size `min(sample_size, 10000)`, therefore `burnin` should be smaller than `min(sample_size, 10000)`.
- `thinning` if `thinning > 1`, every `thinning`-th sample point is used while all others discarded; if computing is parallel, `thinning` is applied to the sample generated by each processor; please note that `hergm` returns `min(sample_size, 10000)` sample points and the thinning is applied to the sample of size `min(sample_size, 10000) - burnin`, therefore `thinning` should be smaller than `min(sample_size, 10000) - burnin`.  


if relabel > 0, relabel MCMC sample by minimizing the posterior expected loss of Schweinberger and Handcock (2015) (relabel == 1) or Peng and Carvalho (2016) (relabel == 2).

if relabel == 1, number of runs of relabeling algorithm.

additional arguments, to be passed to lower-level functions in the future.

- **ergm_theta**: parameters of ergm-terms.
- **alpha**: concentration parameter of truncated Dirichlet process prior of parameters of hergm-terms.
- **eta_mean**: mean parameters of Gaussian base distribution of parameters of hergm-terms.
- **eta_precision**: precision parameters of Gaussian base distribution of parameters of hergm-terms.
- **hergm_theta**: parameters of hergm-terms.
- **loss**: if relabel == TRUE, local minimum of loss function.
- **p_k**: probabilities of block memberships of nodes.
- **indicator**: indicators of block memberships of nodes.
- **p_i_k**: posterior probabilities of block memberships of nodes.
- **prediction**: posterior predictions of statistics.

References


See Also

hergm

Description

The network corresponds to collaborations between 39 workers in a tailor shop in Africa: an undirected edge between workers i and j indicates that the workers collaborated. The network is taken from Kapferer (1972).
Usage

data(kapferer)

Value

Undirected network.

References


See Also

network, hergm, ergm.terms, hergm.terms

plot.hergm

Plot summary of object of class hergm

Description

The function plot.hergm accepts an object of class hergm as argument and plots a summary of a sample of block memberships of nodes from the posterior. Please note that the function hergm should have been called with relabel > 0 to solve the so-called label-switching problem, which is done by default. If the function hergm has not been called with option relabel > 0, call the function hergm.postprocess with relabel > 0.

Usage

## S3 method for class 'hergm'
plot(x, threshold = c(0.7, 0.8, 0.9), ...)

Arguments

x
object of class hergm; objects of class hergm can be generated by function hergm.

threshold
if the component relabel of the object of class hergm is relabel = 3, then threshold is a vector of thresholds between 0 and 1, indicating the thresholds at which the same-block-membership posterior probabilities of nodes are to be thresholded to construct the same-block graphs.

... additional arguments, to be passed to lower-level functions in the future.
**print.hergm**

References


See Also

hergm, hergm.postprocess, print.hergm, summary.hergm

---

### print.hergm

Print summary of object of class hergm

#### Description

The function `print.hergm` accepts an object of class `hergm` as argument and prints a summary of parameters from the posterior. Please note that the function `hergm` should have been called with `relabel > 0` to solve the so-called label-switching problem, which is done by default. If the function `hergm` has not been called with option `relabel > 0`, call the function `hergm.postprocess` with `relabel > 0`.

#### Usage

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

#### Arguments

- `x` object of class `hergm`; objects of class `hergm` can be generated by function `hergm`.
- `...` additional arguments, to be passed to lower-level functions in the future.

#### References


#### See Also

hergm, hergm.postprocess, plot.hergm, summary.hergm
Description

The function `simulate.hergm` accepts an object of class `hergm` as argument and simulates networks.

Usage

```r
## S3 method for class 'hergm'
simulate(object,
          nsim = 1,
          seed = NULL,
          max_number = NULL,
          indicator = NULL,
          eta = NULL,
          sample_size = 1,
          verbose = 0,
          ...)
```

Arguments

- `object`: either object of class `hergm` or formula of the form `network ~ terms`; objects of class `hergm` can be generated by function `hergm`; `network` is an object of class `network` and can be created by calling the function `network`; possible terms can be found in `ergm.terms` and `hergm.terms`.
- `nsim`: redundant, but ensures that the `simulate` method is compatible with the `simulate` method of R package `stats`.
- `seed`: redundant, but ensures that the `simulate` method is compatible with the `simulate` method of R package `stats`.
- `max_number`: maximum number of blocks.
- `indicator`: indicators of block memberships of nodes.
- `eta`: `ergm.terms` and `hergm.terms` parameters.
- `sample_size`: number of networks to be simulated.
- `verbose`: if `verbose == -1`, no console output; if `verbose == 0`, short console output; if `verbose == +1`, long console output.
- `...`: additional arguments, to be passed to lower-level functions in the future.

Value

The function `simulate.hergm` returns the simulated networks in the form of edge lists.
References


See Also

hergm, ergm.terms, hergm.terms, gof.hergm

summary.hergm

Summary of object of class hergm

Description

The function summary.hergm generates a summary of an object of class hergm by using the functions print.hergm and plot.hergm. The function print.hergm prints a summary of a sample of parameters from the posterior, whereas the function plot.hergm plots a summary of a sample of block memberships of nodes from the posterior.

Usage

## S3 method for class 'hergm'
summary(object, ...)

Arguments

object object of class hergm; objects of class hergm can be generated by function hergm.

... additional arguments, to be passed to lower-level functions in the future.

References


See Also

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