Package 'mlsbm'

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Title Efficient Estimation of Bayesian SBMs & MLSBMs

Version 0.99.2

Description Fit Bayesian stochastic block models (SBMs) and multi-level stochastic block models (MLSBMs) using efficient Gibbs sampling implemented in 'Rcpp'. The models assume symmetric, non-reflexive graphs (no self-loops) with unweighted, binary edges. Data are input as a symmetric binary adjacency matrix (SBMs), or list of such matrices (MLSBMs).

License GPL (>= 2)

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

LinkingTo Rcpp, RcppArmadillo

Imports Rcpp

Depends R (>= 2.10)

NeedsCompilation yes

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R topics documented:

AL *Simulated 3-layer network data*

Description

A data set containing 3 layers of undirected, symmetric adjacency matrices simulated from an SBM with 3 true clusters

Usage

```
AL
```

Format

A list of length 3

col_summarize *The col_summarize function*

Description

Function to quickly return credible intervals

Usage

```
col_summarize(MAT, dig = 2, level = 0.95)
```

Arguments

MAT	A matrix
dig	Number of digits to round estimates and CrIs to
level	Confidence level

Value

A character vector of posterior estimates and intervals

Examples

```
M <- matrix(rnorm(1000),ncol = 4)
col_summarize(M)
```

`fit_mlsbm` *R/Rcpp function for fitting multilevel stochastic block model*

Description

This function allows you to fit multilevel stochastic block models.

Usage

```
fit_mlsbm(
  A,
  K,
  a0 = 0.5,
  b10 = 0.5,
  b20 = 0.5,
  n_iter = 1000,
  burn = 100,
  verbose = TRUE
)
```

Arguments

`A`	An adjacency list of length L, the number of levels. Each level contains an n x n symmetric adjacency matrix.
`K`	The number of clusters specified a priori.
`a0`	Dirichlet prior parameter for cluster sizes for clusters 1,...,K.
`b10`	Beta distribution prior paramter for community connectivity.
`b20`	Beta distribution prior parameter for community connectivity.
`n_iter`	The number of total MCMC iterations to run.
`burn`	The number of burn-in MCMC iterations to discard. The number of saved iterations will be n_iter - burn.
`verbose`	Whether to print a progress bar to track MCMC progress. Defaults to true.

Value

A list of MCMC samples, including the MAP estimate of cluster indicators (z)

Examples

```
data(AL)
# increase n_iter in practice
fit <- fit_mlsbm(AL,3,n_iter = 100)
```

`fit_sbm` *R/Rcpp function for fitting single level stochastic block model*

Description

This function allows you to fit single level stochastic block models.

Usage

```
fit_sbm(
  A,
  K,
  a0 = 0.5,
  b10 = 0.5,
  b20 = 0.5,
  n_iter = 1000,
  burn = 100,
  verbose = TRUE
)
```

Arguments

`A`	An n x n symmetric adjacency matrix.
`K`	The number of clusters specified a priori.
`a0`	Dirichlet prior parameter for cluster sizes for clusters 1,...,K.
`b10`	Beta distribution prior paramter for community connectivity.
`b20`	Beta distribution prior parameter for community connectivity.
`n_iter`	The number of total MCMC iterations to run.
`burn`	The number of burn-in MCMC iterations to discard. The number of saved iterations will be n_iter - burn.
`verbose`	Whether to print a progress bar to track MCMC progress. Defaults to true.

Value

A list of MCMC samples, including the MAP estimate of cluster indicators (z)

Examples

```
data(AL)
fit <- fit_sbm(AL[[1]],3)
```

`mean_CRI` *The mean_CRI function*

Description

Simple function to return the mean (95% CrI) for a vector

Usage

```
mean_CRI(y, dig = 2)
```

Arguments

`y`	A numeric vector
`dig`	The number of digits to round to

Value

A string of mean and 95% quantile interval rounded to 'dig'

Examples

```
mean_CRI(rnorm(1000))
```

`mlsbm` *mypackage: A package for fitting single and multilevel SBMs.*

Description

This package fits Bayesian stochastic block models (SBMs)

mlsbm functions

The mlsbm functions ...

sample_mlsbm *R/Rcpp function for sampling from a multilevel stochastic block model*

Description

This function allows you to sample a multilevel stochastic block model.

Usage

```
sample_mlsbm(z, P, L)
```

Arguments

z	An n x 1 vector of community labels for each node
P	A K x K symmetric matrix of community connectivity probabilities
L	The number of levels to sample

Value

A list of adjecency matrices – one for each level of the MLSBM

Examples

```
n = 100
K = 3
L = 2
pi = rep(1/K,K)
z = sample(1:K, size = n, replace = TRUE, prob = pi)
p_in = 0.50
p_out = 0.05
P = matrix(p_out, nrow = K, ncol = K)
diag(P) = p_in
AL = sample_mlsbm(z,P,L)
```

sample_sbm *R/Rcpp function for sampling from a single level stochastic block model*

Description

This function allows you to sample a single level stochastic block model.

Usage

```
sample_sbm(z, P)
```

Arguments

z	An n x 1 vector of community labels for each node
P	A K x K symmetric matrix of community connectivity probabilities

Value

An adjacency matrix

Examples

```
n = 100
K = 3
pi = rep(1/K,K)
z = sample(1:K, size = n, replace = TRUE, prob = pi)
p_in = 0.50
p_out = 0.05
P = matrix(p_out, nrow = K, ncol = K)
diag(P) = p_in
A = sample_sbm(z,P)
```

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