Package ‘netClust’

Type Package
Title Model-Based Clustering of Network Data
Version 1.0.1
Date 2020-06-09
Author Shuchismita Sarkar [aut, cre], Volodymyr Melnykov [aut]
Maintainer Shuchismita Sarkar <ssarkar@bgsu.edu>
Description Clustering unilayer and multilayer network data by means of finite mix-
tures is the main utility of 'netClust'.
License GPL (>= 2)
Imports Rcpp (>= 1.0.2)
LinkingTo Rcpp, RcppArmadillo
RoxygenNote 7.1.1
Encoding UTF-8
NeedsCompilation yes
Depends R (>= 3.5.0)
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Description

Clustering unilayer and multilayer network data by means of finite mixtures is the main utility of 'netClust'.

Details

The DESCRIPTION file:

Package: netClust
Type: Package
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Version: 1.0.1
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Author: Shuchismita Sarkar [aut, cre], Volodymyr Melnykov [aut]
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Encoding: UTF-8

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netClust-package Model-Based Clustering of Network Data
netData Dataset: netData
netDataID Dataset: netDataID
netEM_multilayer Returns the EM object for multilayer network
netEM_unilayer Returns the EM object for unilayer network

Clustering unilayer and multilayer network data by means of finite mixtures is the main utility of 'netClust'.

Author(s)

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Maintainer: Shuchismita Sarkar <ssarkar@bgsu.edu>

References

Examples

data(netData) ## Read network data
data(netDataID) ## Read original ID for network data

n <- dim(netData)[1] ## number of nodes of the network
p <- dim(netData)[4] ## number of layers of the network
K <- 2 ## number of clusters
y <- netData

eps=0.0001
RndStrtUni= 3
RndStrtMult= 5
SmEMUni= 2
SmEMMult= 3
ItrSmEM=5
burn = 10*n
ItrMCMC= 50*n
sSigma = 1
sPsi = 1
a=0

##########################################
### Run unilayer network EM on layer 1 ###
##########################################

x <- array(0, dim = c(n,n,2))
for (i in 1:n){
  for (j in 1:n){
    x[i,j,] <- y[i,j,,1]
  }
}

E <- netEM_unilayer(x, K, eps, RndStrtUni, SmEMUni, ItrSmEM, burn, ItrMCMC, sSigma,a)
cat("Unilayer network", "Original ID", netDataID, "\n")
cat("Unilayer network", "Assigned ID", E$id, "\n")

##########################################
### Run multilayer network EM ###
##########################################

E <- netEM_multilayer(y,K,p, eps, RndStrtMult, SmEMMult, ItrSmEM, burn, ItrMCMC, sSigma, sPsi, n, a)
cat("Multilayer network", "Original ID", netDataID, "\n")
cat("Multilayer network", "Assigned ID", E$id, "\n")

netData

Dataset: netData

Description

Network data with 10 nodes and 2 layers
Usage

```r
data("netData")
```

Format

The format is: `num [1:10, 1:10, 1:2, 1:2] 0 0 0 0 0 0 0 0 0 0 ...
```

Details

Dataset demonstrating multilayer network

Source

Sarkar, S. (2020)

References


Examples

```r
data(netData)
## maybe str(netData) ; plot(netData) ...
```

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Description

ID for netData dataset

Usage

```r
data("netDataID")
```

Format

A data frame with 10 observations on the following 1 variable.

- `netDataID` a numeric vector

Details

ID for the dataset demonstrating multilayer network

Source

Sarkar, S. (2020)
References

Examples
data(netDataID)
## maybe str(netDataID) ; plot(netDataID) ...

netEM_multilayer

Returns the EM object for multilayer network

Description
Returns the EM object for multilayer network

Usage
netEM_multilayer(
  y, 
  K, 
  p, 
  eps, 
  num_rand_start, 
  num_run_smallEM, 
  max_itr_smallEM, 
  burn, 
  MCMC_itr, 
  sigma_mult, 
  psi_mult, 
  n, 
  alpha 
)

Arguments
y multiple network
K number of clusters
p number of layers
eps epsilon for convergence
num_rand_start number of random starts
num_run_smallEM number of runs for small EM
max_itr_smallEM maximum number of runs for small EM
**netEM_unilayer**

burn: number of runs for burn for Metropolis Hastings
MCMC_itr: number of runs for Metropolis Hastings iterations
sigma_mult: scaling multiplier for Sigma matrix
psi_mult: scaling multiplier for Psi matrix
n: number of nodes of the network
alpha: seed provided by the user

**Value**

EM object

---

**netEM_unilayer**  \hspace{1em} Returns the EM object for unilayer network

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**Description**

Returns the EM object for unilayer network

**Usage**

```r
netEM_unilayer(
  x,
  K,
  eps,
  num_rand_start,
  num_run_smallEM,
  max_itr_smallEM,
  burn,
  MCMC_itr,
  sigma_mult,
  alpha
)
```

**Arguments**

x: multiple network
K: number of clusters
eps: epsilon for convergence
num_rand_start: number of random starts
num_run_smallEM: number of runs for small EM
max_itr_smallEM: maximum number of runs for small EM
burn: number of runs for burn for Metropolis Hastings
MCMC_itr: number of runs for Metropolis Hastings iterations
sigma_mult: scaling multiplier for Sigma matrix
alpha: seed provided by the user
netEM_unilayer

Value

EM object
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