Package 'netClust'

October 13, 2022

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 mixtures 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)

Repository CRAN

Date/Publication 2020-07-07 09:30:02 UTC

R topics documented:

netClust-package *Model-Based Clustering of Network Data*

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
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 mixtures is the main utility of 'netClust'.
License:	GPL (>= 2)
Imports:	Rcpp (>= 1.0.2)
LinkingTo:	Rcpp, RcppArmadillo
RoxygenNote:	7.1.1
Encoding:	UTF-8

Index of help topics:

```
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)

Shuchismita Sarkar [aut, cre], Volodymyr Melnykov [aut]

Maintainer: Shuchismita Sarkar <ssarkar@bgsu.edu>

References

Sarkar, S. (2019) On the use of transformations for modeling multidimensional heterogeneous data, The University of Alabama Libraries Digital Collections

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

```
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

Sarkar, S. (2019) On the use of transformations for modeling multidimensional heterogeneous data, The University of Alabama Libraries Digital Collections

Examples

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

`netDataID` *Dataset: netDataID*

Description

ID for netData dataset

Usage

```
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

Sarkar, S. (2019) On the use of transformations for modeling multidimensional heterogeneous data, The University of Alabama Libraries Digital Collections

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

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` *Returns the EM object for unilayer network*

Description

Returns the EM object for unilayer network

Usage

```
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

Value

EM object

Index