Package 'LLSM'

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Type Package

Title Package to Fit Longitudinal Latent Space Model

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Description Package to Fit LSM in Longitudinal Network Data

License GPL (>=2)

Imports Rcpp (>= 0.11.6),MASS, mvtnorm,igraph

LinkingTo Rcpp, RcppArmadillo

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R topics documented:

LLSM-package   *Package to Fit Longitudinal Latent Space Model*

Description

Package to Fit LSM in Longitudinal Network Data

Details

The DESCRIPTION file: This package was not yet installed at build time.

Index: This package was not yet installed at build time.
~~ An overview of how to use the package, including the most important ~~ ~~ functions ~~

Author(s)

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References

~~ Literature or other references for background information ~~

See Also

~~ Optional links to other man pages, e.g. ~~ ~~ <pkg> ~~

---

genYY   *genYY*

Description

generate network data for simulation

Usage

```
genYY(Phi, Tau, Beta, TT, dd, nn)
```

Arguments

Phi	dd by dd autoregressive parameter matrix
Tau	dd by dd variance-covariance matrix of the error
Beta	intercept
TT	Total time point
dd	dimension of the latent space positions
nn	Number of nodes in the network

Details

~~ If necessary, more details than the description above ~~

Note

~~further notes~~

Author(s)

SA

References

~put references to the literature/web site here ~

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genYY_AR   *Function to simulate longitudinal network data under LLSM-AR*
                            model

Description

genYY_AR generate longitudinal networks under LLSM-AR model

Usage

```
genYY_AR(Phi, Tau, Beta, TT, dd, nn)
```

Details

genYY_AR generate longitudinal networks under LLSM-AR model

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getBeta   *Helper function to get the samples from the posterior chain of the pa-*
                            rameter after burnin and thining

Description

getIntercept returns the samples from the posterior chain of the parameter after burnin and thining

Usage

```
getBeta(object, burnin = 0, thin = 1)
```

Arguments

object	object of class LLSM returned from either lsm, lsmCOV, llsmRW, llsmRWcov or llsmAR.
burnin	number of samples from the posterior chain that needs to be discarded
thin	argument specifying the thinin parameter for the chain

---

getIntercept   *Function to get the MCMC chain of Intercept after burnin and thinning*

Description

getIntercept returns the posterior chain of the intercept in object of class 'LLSM'

Usage

```
getIntercept(object, burnin = 0, thin = 1)
```

Arguments

object	fitted model object of class 'LLSM'
burnin	numeric value to specify the number of draws that must be discarded as burnin
thin	numeric value that is used to specify the step at which MCMC chain must be kept

Details

getIntercept returns the posterior chain of the intercept in object of class 'LLSM'

---

getLikelihood   *Function to get the MCMC chain of Intercept after burnin and thinning*

Description

getLikelihood returns the likelihood of the data at posterior chain of the MCMC in object of class 'LLSM'

Usage

```
getLikelihood(object, burnin = 0, thin = 1)
```

Arguments

object	fitted model object of class 'LLSM'
burnin	numeric value to specify the number of draws that must be discarded as burnin. Default value is 0.
thin	numeric value that is used to specify the step at which MCMC chain must be kept. Default value is 1.

Details

getLikelihood returns the likelihood of the data at posterior chain of the MCMC in object of class 'LLSM'

---

getLS	*Function to get the MCMC chain of the latent space postions in the longitudinal network models after burnin and thinning*

Description

getLLSM returns the list of arrays of dimension n by d by K, of the K posterior chains of the latent space postions in object of class 'LLSM' for longitudinal model fits

Usage

```
getLS(object, burnin = 0, thin = 1)
```

Arguments

object	fitted model object of class 'LLSM'
burnin	numeric value to specify the number of draws that must be discarded as burnin
thin	numeric value that is used to specify the step at which MCMC chain must be kept

Details

getLLSM returns the list of arrays of dimension n by d by K, of the K posterior chains of the latent space postions in object of class 'LLSM' for longitudinal model fits. The length of the list is equal to the number of time points in the data.

---

getLSlsm	*Function to get the MCMC chain of the latent space postions from the static LSM after burnin and thinning*

Description

getLLSM returns an array of dimension n by d by K, of the K posterior chains of the latent space postions in object of class 'LLSM' for longitudinal model fits

Usage

```
getLSlsm(object, burnin = 0, thin = 1)
```

Arguments

object	fitted LSM model object of class 'LLSM'
burnin	numeric value to specify the number of draws that must be discarded as burnin
thin	numeric value that is used to specify the step at which MCMC chain must be kept

Details

getLLSM returns an array of dimension n by d by K, of the K posterior chains of the latent space postions in object of class 'LLSM' for longitudinal model fits

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getModeLS   *Function to get the posterior Mode of the latent space positions at each time point*

Description

getModeLS returns the posterior Mode of the MCMC chain the latent space positions at fixed time point

Usage

```
getModeLS(latent.space.pos)
```

Arguments

latent.space.pos

> matrix of dimension n by d by K, where K is the length of the chain

Details

getModeLS returns the posterior Mode of the MCMC chain the latent space positions at fixed time point. Current version of getModeLS works for 2-dimensional latent space only

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getPhi   *Function to get the MCMC chain of Phi after burnin and thinning*

Description

getPhi returns the posterior chain of the VAR parameter in LLSM-AR models from the object of class 'LLSM'

Usage

```
getPhi(object, burnin = 0, thin = 1)
```

Arguments

object	fitted model object of class 'LLSM'
burnin	numeric value to specify the number of draws that must be discarded as burnin. Default value is 0.
thin	numeric value that is used to specify the step at which MCMC chain must be kept. Default value is 1

Details

getPhi returns the posterior chain of the VAR parameter in LLSM-AR models from the object of class 'LLSM'

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likelihood	*Function to compute the logistic log-likelihood in the latent space model*

Description

likelihood returns the logistic log-likelihood in LSM

Usage

```
likelihood(Y, Z, intercept)
```

Arguments

Y	the adjacency matrix of binary ties information
Z	the matrix of latent positions
intercept	the intercept in the model

Details

likelihood returns the logistic log-likelihood in LSM (for both directed and undirected networks)

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llsmAR	*Run Latent Space Model on Longitudinal Network Data with AR evolution on Latent Space*

Description

llsmAR runs and tunes MCMC sampler on the network data

Usage

```
llsmAR(Y, initialVals = NULL, priors = NULL, tune = NULL, tuneIn = TRUE,
  dd, niter, prTransformed = TRUE)
```

Arguments

Y	list of sociomatrices for longitudinal network data
initialVals	List of initialization use default if NULL
priors	List of prior specification
tune	List of tuning parameters
tuneIn	Logical to indicate if tuning is required
dd	Dimension of the latent space positions
niter	Number of iterations for MCMC run
prTransformed	Logical to indicate if procrustes transformation is to be done during sampling of latent positions

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llsmRW   *Function to run MCMC sampler for the LLSM-RW model*

Description

llsmRW runs MCMC sampler for the LLSM-RW model.

Usage

```
llsmRW(Y, initialVals = NULL, priors = NULL, tune = NULL, tuneIn = TRUE,
  dd, niter)
```

Arguments

Y	A list of sociomatrix for observed networks
initialVals	A list of values for initializing the chain for intercept and ZZ. Default is set to NULL, when random initialization is used.
priors	A list of parameters for prior distribution specified as MuBeta, VarBeta, VarZ, A and B If set to NULL, default priors is used
tune	A list of tuning parameters. If set to NULL, default values are used.
tuneIn	Logical option to specify whether to auto tune the chain or not. Default is TRUE
dd	Dimension of the latent space
niter	Number of MCMC iterations to run

Details

llsmRW runs MCMC sampler for the LLSM-RW model and returns samples from the posteriors chains of the parameters, the posterior likelihood at the accpeted parameters, a list of acceptance rates from the metropolis hastings sampling, and a list of the tuning values if tuneIn is set to TRUE

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llsmRWCOV   *Function to run MCMC sampler for the LLSM-RW model*

Description

llsmRWCOV runs MCMC sampler for the LLSM-RW model.

Usage

```
llsmRWCOV(Y, X = NULL, initialVals = NULL, priors = NULL, tune = NULL,
  tuneIn = TRUE, dd, niter)
```

Arguments

Y	A list of sociomatrix for observed networks
initialVals	A list of values for initializing the chain for intercept and ZZ. Default is set to NULL, when random initialization is used.
priors	A list of parameters for prior distribution specified as MuBeta, VarBeta, VarZ, A and B If set to NULL, default priors is used
tune	A list of tuning parameters. If set to NULL, default values are used.
tuneIn	Logical option to specify whether to auto tune the chain or not. Default is TRUE
dd	Dimension of the latent space
niter	Number of MCMC iterations to run

Details

llsmRW runs MCMC sampler for the LLSM-RW model and returns samples from the posteriors chains of the parameters, the posterior likelihood at the accpeted parameters, a list of acceptance rates from the metropolis hastings sampling, and a list of the tuning values if tuneIn is set to TRUE

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lsm	*Function to run MCMC sampler in the LSM model for a static network.*

Description

lsm runs MCMC sampler in the LSM model for a static network.

Usage

```
lsm(Y, Y1 = NULL, initialVals = NULL, priors = NULL, tune = NULL,
  tuneIn = TRUE, dd, niter)
```

Arguments

Y	A sociomatrix for observed network
initialVals	A list of values for initializing the chain for intercept and ZZ. Default is set to NULL, when random initialization is used.
priors	A list of parameters for prior distribution specified as MuBeta, VarBeta, VarZ, A and B If set to NULL, default priors is used
tune	A list of tuning parameters. If set to NULL, default values are used.
tuneIn	Logical option to specify whether to auto tune the chain or not. Default is TRUE
dd	Dimension of the latent space
niter	Number of MCMC iterations to run

Details

lsm runs MCMC sampler for the LSM model of Hoff(2001) and returns samples from the posteriors chains of the parameters, the posterior likelihood at the accpeted parameters, a list of acceptance rates from the metropolis hastings sampling, and a list of the tuning values if tuneIn is set to TRUE

procrustes	*Function to do Procrustes transformation on a matrix to to a fixed target*

Description

Function to do Procrustes transformation on a matrix to a fixed target

Usage

```
procrustes(Z00, C, z)
```

Arguments

C	centering matrix
z	matrix on which Procrustes transformation is done

Details

Function to do Procrustes transformation on a matrix to a fixed target

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