Package ‘latentSNA’

June 14, 2024

Title What the Package Does (One Line, Title Case)

Version 0.0.0.9000

Description What the package does (one paragraph).

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R topics documented:

`latentSNA` *Attribute informed brain connectivity*

Description

An MCMC algorithm for fitting the latentSNA model

Usage

```
latnetSNA(X, Y, W, H, seed = 1, nscan =
10000, burn = 500, odens = 25,
prior=list())
```

Arguments

`X`	a list of V x V brain connectivity data.
`Y`	a list of V x P attribute data.
`W`	a matrix of N x Q covariates for the connectivity data.
`H`	a matrix of N x Q1 covariates for the attribute data.
`seed`	random seed
`nscan`	number of iterations of the Markov chain (beyond burn-in)
`burn`	burn in for the Markov chain
`odens`	output density for the Markov chain
`prior`	list: A list of hyperparameters for the prior distribution

Value

`COV`	posterior mean of the covariance parameters between brain and behaviors
`BETAPM`	posterior mean of the regression coefficient parameters for the connectivity data
`GAMMAPM`	posterior mean of the regression coefficient parameters for the attribute data
`THETAPM`	posterior samples of the latent person variable
`APM`	posterior mean of connectivity intercepts
`BPM`	posterior mean of attribute intercepts
`U`	last iteration of latent connectivity for all regions
`UPM`	posterior mean of U
`UVPM.l`	list of posterior mean of connectivity
`Theta`	the last iteration of the Theta estimate
`X`	observed X
`Y`	observed Y
`EFlPM`	posterior mean estimates of X
`ETPM`	posterior mean estiamtes of Y
`TMPM`	posterior mean estimates of latent behavior component
`FLPM`	posterior mean estiamtes of latent connectivity component
`input`	input values

Author(s)

Selena Wang

rbeta_a *Conditional simulation of intercept and regression coefficients*

Description

Simulates from the joint full conditional distribution of (beta) in a brain connectivity model

Usage

```
rbeta_a(Fl, W = NULL, s2 = 1, U = U, ivA = NULL, beta0 = NULL, S0 = NULL)
```

Arguments

Fl	a list of V X V normal connectivity matrix
W	N x Q covariate matrix
s2	variance
U	a V by V by N array
ivA	prior inverse variance for the intercept parameters
beta0	prior mean vector for regression parameters
S0	prior precision matrix for regression parameters

Value

beta	regression coefficients
a	subject-specific intercept

Author(s)

Selena Wang

rFl_nrm *Simulate missing values in a normal connectivity model*

Description

Simulates missing values of a sociomatrix under a normal connectivity model

Usage

```
rFl_nrm(Z, EZ, s2, X)
```

Arguments

Z	a square matrix, the current value of Z
EZ	expected value of Z
s2	dyadic variance
X	square relational matrix

Value

a square matrix, equal to at non-missing values

Author(s)

Selena Wang

`rH_bin` *Simulate H*

Description

Simulates a random latent matrix H given its expectation and a behavior matrix Y

Usage

```
rH_bin(H, EH, Y)
```

Arguments

`H`	a n X m matrix, the current value of H
`EH`	expected value of H
`Y`	n X m binary item response matrix
`s1`	item response variance

Value

a n X m matrix, the new value of H

Author(s)

Selena Wang

`rH_nrm` *Simulate missing values in a normal behavior model*

Description

Simulates missing values under a behavior model

Usage

```
rH_nrm(H, EH,s1, Y)
```

Arguments

`H`	a matrix, the current value of H
`EH`	expected value of H
`s1`	behavior variance
`Y`	behavior matrix

Value

a behavior matrix, equal to at non-missing values

Author(s)

Selena Wang

`rs1_b` *Gibbs update for behavior variance*

Description

Gibbs update for behavior variance

Usage

```
rs1(Tm, offset=0,nu1=NULL,s10=NULL)
```

Arguments

`Tm`	a list of V X P normal behavior matrix
`nu1`	prior degrees of freedom
`s10`	prior estimate of s1

Value

a new value of s1

Author(s)

Selena Wang

`rs2` *Gibbs update for connectivity variance*

Description

Gibbs update for connectivity variance

Usage

```
rs2(Fl, offset=0,nu2=NULL,s20=NULL)
```

Arguments

`Fl`	a list of V X V normal connectivity matrix
`nu2`	prior degrees of freedom
`s20`	prior estimate of s2

Value

a new value of s2

Author(s)

Selena Wang

`rSu` *Gibbs update for latent effects covariance*

Description

Gibbs update for latent effects covariance

Usage

```
rSu(U,Su0=NULL,etau=NULL)
```

Arguments

`U`	latent connectivity and behavior
`Su0`	prior (inverse) scale matrix for the prior distribution
`etau`	prior degrees of freedom for the prior distribution

Author(s)

Selena Wang

`rTheta_b` *Gibbs sampling of Theta*

Description

A Gibbs sampler for updating the Person latent effect Theta.

Usage

```
rTheta(H, beta, Alpha, Theta ,U, Stheta, Sutheta, Su, s1)
```

Arguments

`H`	N X P normal behavior matrix
`beta`	P X 1 behavior intercept vector
`Alpha`	1 X 1 intercept vector
`Theta`	current value of Theta
`U`	matrix containing current value of U
`Stheta`	covariance of Theta
`Sutheta`	covariance between U and Theta
`Su`	matrix containing covariance of U
`s1`	behavior variance

Value

`Theta` a new value of Theta

Author(s)

Selena Wang

`rU` *Gibbs sampling of U*

Description

A Gibbs sampler for updating U.

Usage

```
rU(Fl,U,Theta, Stheta, Sutheta, Su, s2=1, offset=offset)
```

Arguments

`Fl`	a list of V X V normal relational matrix
`EFl`	a list of the same dimension as Fl. It is assumed that Fl-offset follows a SRRM, so the offset should contain any multiplicative effects (such as `U%*% t(U)`)
`U`	V X K matrix containing current value of U
`Theta`	D X V current value of Theta
`Stheta`	D X D covariance of Theta
`Sutheta`	D X K covariance between U and Theta
`Su`	K X K matrix containing covariance of U
`s2`	dyadic variance

Value

`U` a new value of U

Author(s)

Selena Wang

rXi — *Gibbs sampling of behaivor parameters Xi*

Description

A Gibbs sampler for updating the behavior parameters.

Usage

```
rXi(H, beta, Alpha, Theta, mxi, Sigmaxi, s1 = 1)
```

Arguments

`H`	normal behavior matrix
`beta`	behavior intercept vector
`Alpha`	behavior intercept vector
`Theta`	current value of Theta
`mxi`	vector of prior for the mean of Xi
`Sigmaxi`	matrix of prior for the variance of Xi
`s1`	behavior variance

Value

`beta`	a new value of beta
`Alpha`	a new value of Alpha

Author(s)

Selena Wang

simH — *Simulate H given its expectation and covariance*

Description

Simulate H given its expectation and covariance

Usage

```
simH(EH, s1 = 1)
```

Arguments

`EH`	expected value of H
`s1`	attribute variance

Value

a simulated value of H

Author(s)

Selena Wang

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simX_nrm — *Simulate a normal connectivity matrix*

Description

Simulates a normal connectivity matrix

Usage

```
simX_nrm(EX, s2)
```

Arguments

`EX`	square matrix giving the expected value of the connectivity matrix
`s2`	dyadic variance

Value

a square matrix

Author(s)

Selena Wang

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simY_nrm — *Simulate a normal behavior matrix*

Description

Simulates a normal behavior matrix

Usage

```
simY_nrm(EY, s1)
```

Arguments

`EY`	matrix giving the expected value of the behavior matrix
`s1`	variance

Value

a N by P matrix

Author(s)

Selena Wang

`simZ` *Simulate Z given its expectation and covariance*

Description

Simulate Z given its expectation and covariance

Usage

```
simZ(EZ, rho, s2 = 1)
```

Arguments

`EZ`	expected value of Z
`s2`	dyadic variance

Value

a simulated value of Z

Author(s)

Selena Wang

Index