

Package ‘baygel’

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Type Package

Title Bayesian Estimators for Gaussian Graphical Models

Version 0.1.0

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Description

Implements a Bayesian graphical ridge data-augmented block Gibbs sampler. The sampler simulates the posterior distribution of precision matrices of a Gaussian Graphical Model. This sampler is proposed in Smith, Arashi, and Bekker (2022) <[doi:10.48550/arXiv.2210.16290](https://doi.org/10.48550/arXiv.2210.16290)>.

License GPL (>= 3)

Imports Rcpp (>= 1.0.8), RcppArmadillo (>= 0.11.1.1.0)

LinkingTo Rcpp, RcppArmadillo, RcppProgress

Suggests MASS, pracma

RoxygenNote 7.2.3

URL <https://github.com/Jarod-Smith/baygel>

NeedsCompilation yes

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blockBAGR *Block Gibbs sampler function.*

Description

A Bayesian adaptive graphical ridge-type data-augmented block Gibbs sampler for simulating the posterior distribution of the concentration matrix specifying a Gaussian graphical model.

Usage

```
blockBAGR(X, burnIn, iterations, s = 1, t = 1, verbose = TRUE)
```

Arguments

X	Numeric data matrix, data is assumed to be Gaussian distributed.
burnIn	An integer specifying the number of burn-in iterations.
iterations	An integer specifying the length of the Markov chain after the burn-in iterations.
s	A double specifying the value of the prior inverse gamma's shape parameter.
t	A double specifying the value of the prior inverse gamma's scale parameter.
verbose	A logical determining whether the progress of the MCMC sampler should be displayed.

Value

blockBAGR: List of precision matrices from the Markov chains.

Examples

```
# Generate true covariance matrix:
p      <- 10
n      <- 50
SigTrue <- pracma::Toeplitz(c(0.7^rep(1:p-1)))
CTrue  <- pracma::inv(SigTrue)
# Generate expected value vector:
mu     <- rep(0,p)
# Generate multivariate normal distribution:
set.seed(123)
X      <- MASS::mvrnorm(n,mu=mu,Sigma=SigTrue)
posterior <- blockBAGR(X,iterations = 1000, burnIn = 500)
```

blockBSGR	<i>Block Gibbs sampler function.</i>
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Description

A Bayesian standard graphical ridge-type data-augmented block Gibbs sampler for simulating the posterior distribution of the concentration matrix specifying a Gaussian graphical model.

Usage

```
blockBSGR(X, burnIn, iterations, tau = 1, mu = 0, verbose = TRUE)
```

Arguments

X	Numeric data matrix, data is assumed to be Gaussian distributed.
burnIn	An integer specifying the number of burn-in iterations.
iterations	An integer specifying the length of the Markov chain after the burn-in iterations.
tau	A double specifying the value of the variance parameter of both the Gaussian and truncated Gaussian distribution in Bayesian graphical ridge prior.
mu	A double specifying the value of the mean parameter of both the Gaussian and truncated Gaussian distribution in Bayesian graphical ridge prior.
verbose	A logical determining whether the progress of the MCMC sampler should be displayed.

Value

blockBSGR: List of precision matrices from the Markov chains.

Examples

```
# Generate true covariance matrix:
p      <- 10
n      <- 50
SigTrue <- pracma::Toeplitz(c(0.7^rep(1:p-1)))
CTrue  <- pracma::inv(SigTrue)
# Generate expected value vector:
mu     <- rep(0,p)
# Generate multivariate normal distribution:
set.seed(123)
X      <- MASS::mvrnorm(n,mu=mu,Sigma=SigTrue)
posterior <- blockBSGR(X,iterations = 1000, burnIn = 500)
```

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