

Package ‘MMVBVS’

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Type Package

Title Missing Multivariate Bayesian Variable Selection

Version 0.8.0

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Description A variable selection tool for multivariate normal variables with missing-at-random values using Bayesian Hierarchical Model.

Visualization functions show the posterior distribution of gamma (inclusion variables) and beta (coefficients).

Users can also visualize the heatmap of the posterior mean of covariance matrix.

Kim, T. Nicolae, D. (2019) <<https://github.com/tk382/MMVBVS/blob/master/workingpaper.pdf>>.

[//github.com/tk382/MMVBVS/blob/master/workingpaper.pdf](https://github.com/tk382/MMVBVS/blob/master/workingpaper.pdf).

Guan, Y. Stephens, M. (2011) <[doi:10.1214/11-AOAS455](https://doi.org/10.1214/11-AOAS455)>.

License GPL (>= 2)

Encoding UTF-8

LazyData true

LinkingTo Rcpp, RcppArmadillo

Imports Rcpp, reshape, reshape2, ggplot2, rlang

RoxygenNote 6.1.1

Suggests testthat, MASS

NeedsCompilation yes

Repository CRAN

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beta_dist	<i>Plot the posterior distribution of the coefficients</i>
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Description

Plot the posterior distribution of the coefficients

Usage

```
beta_dist(result, title = "")
```

Arguments

result	resulting object from mmvbvs function
title	A string object for the title of the resulting plot

Value

ggplot object

mmvbvs	<i>Main function for variable selection</i>
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Description

Main function for variable selection

Usage

```
mmvbvs(X, Y, initial_chain, Phi, marcor, niter = 1000L, bgiter = 500L,
        hiter = 50L, burnin = 100000L, Vbeta = 1L, smallchange = 1e-04,
        verbose = TRUE)
```

Arguments

X	covariate with length N, sample size
Y	multivariate normal response variable N by P
initial_chain	list of starting points for beta, gamma, sigma, and sigmabeta. beta is length P for the coefficients, gamma is length P inclusion vector where each element is 0 or 1. sigma should be P x P covariance matrix, and sigmabeta should be the expected variance of the betas.
Phi	prior for the covariance matrix. We suggest identity matrix if there is no appropriate prior information

marcor	length P vector of correlation between X and each variable of Y
niter	total number of iteration for MCMC
bgiter	number of MH iterations within one iteration of MCMC to fit Beta and Gamma
hiter	number of first iterations to ignore
burnin	number of MH iterations for h, proportion of variance explained
Vbeta	variance of beta
smallchange	perturbation size for MH algorithm
verbose	if set TRUE, print gamma for each iteration

Value

list of posterior beta, gamma, and covariance matrix sigma

Examples

```

beta = c(rep(0.5, 3), rep(0,3))
n = 200; T = length(beta); nu = T+5
Sigma = matrix(0.8, T, T); diag(Sigma) = 1
X = as.numeric(scale(rnorm(n)))
error = MASS::mvrnorm(n, rep(0,T), Sigma)
gamma = c(rep(1,3), rep(0,3))
Y = X %*% t(beta) + error; Y = scale(Y)
Phi = matrix(0.5, T, T); diag(Phi) = 1
initial_chain = list(beta = rep(0,T),
                     gamma = rep(0,T),
                     Sigma = Phi,
                     sigmabeta = 1)
result = mmvbvs(X = X,
               Y = Y,
               initial_chain = initial_chain,
               Phi = Phi,
               marcor = colMeans(X*Y, na.rm=TRUE),
               niter=10,
               verbose = FALSE)

```

plot_beta

Plot the coefficients for each variable for each iteration of MCMC

Description

Plot the coefficients for each variable for each iteration of MCMC

Usage

```
plot_beta(result, title = "")
```

Arguments

result	Output object from mmvbvs function
title	A string object for the title of the resulting plot

Value

ggplot object

plot_gamma	<i>Plot the the inclusion of each variable for each MCMC iteration</i>
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Description

Plot the the inclusion of each variable for each MCMC iteration

Usage

```
plot_gamma(result, title = "")
```

Arguments

result	Output object from mmvbvs function
title	A string object for the title of the resulting plot

Value

ggplot object

plot_sigma	<i>Plot the posterior mean of the covariance matrix</i>
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Description

Plot the posterior mean of the covariance matrix

Usage

```
plot_sigma(result, title = "")
```

Arguments

result	resulting object from mmvbvs function
title	A string object for the title of the resulting plot

Value

ggplot object

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