

Description

logit.mh: Function which produces one or multiple Metropolis-Hastings chains for logistic regression cases of the type

$$\log \text{it}(p_i) = a + bx_i, \text{ with } y_i | p_i \sim \text{Bin}(n_i, p_i) \text{ for } i = 1, \dots, n_i$$

with prior specification $a \sim N(0, k)$, $b \sim N(0, k)$ and a bivariate normal random walk proposal

$$\begin{pmatrix} a^t \\ b^t \end{pmatrix} \sim N_2 \left(\begin{pmatrix} a^{t-1} \\ b^{t-1} \end{pmatrix}, \Sigma \right), \text{ with } \Sigma = \begin{pmatrix} \sigma_a^2 & \rho \sigma_a \sigma_b \\ \rho \sigma_a \sigma_b & \sigma_b^2 \end{pmatrix}.$$

Usage

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logit.mh(y, x, sizes, n, l=1, discard=n/2, initial.matrix, sd, cor=0, hyper.par=1000,  
        update=FALSE, plot=TRUE)
```

Arguments

y: the vector containing the y_i 's.

x: the vector containing the x_i 's.

sizes: the vector containing the n_i 's.

n: the number of Metropolis-Hastings iterations.

l: the number of Metropolis-Hastings chains to be produced, the default choice is 1 chain.

discard: the number of discarded iterations for the “burn-in” period. The default value $n/2$ discards the first half of the chain. This arguments must *always* be smaller than n .

initial.matrix: A matrix which contains the initial values of the simulation. This argument must be given in matrix form. If $l=1$ (one chain) the initial.matrix must be of dimension 1×2 with column one containing the initial value for parameter a and column two the initial value for parameter b . If $l>1$ i.e. $l=4$ then the initial matrix must be of dimension 4×2 . In this case the 1st column must contain 4 initial values for parameter a and the 2nd column must contain 4 initial values for parameter b .

sd: A vector with two elements corresponding to the proposals *standard deviations* σ_a and σ_b for parameters a (1st element) and b (2nd element).

cor: The correlation ρ between parameters a, b . The default value is 0.

hyper.par: a scalar corresponding to k , the default value is $k = 1000$.

update: A logical argument. If TRUE then the initial choices for parameters σ_a , σ_b and ρ are replaced at iterations $n/4$, $n/2$ and $3n/4$ with the MCMC estimates acquired by the preceding draws of parameters a , b belonging to the intervals $[1, n/4]$, $(n/4, n/2]$ and $(n/2, 3n/4]$ respectively.

plot: A logical argument. If TRUE and $l=1$ (one chain) then time series plots, autocorrelation plots and histograms for the draws of parameters a , b are returned. If TRUE and $l>1$ (multiple chains) then ergodic mean plots and histograms for the draws of parameters a , b are returned.

Components

logit.mh returns the following components:

parameters: The draws of parameters from the posterior distribution.

acceptance_ratio: The acceptance ratio of each chain.

R_root: The calculated R reduction measure (returned only if $l>1$).

lengths: The size of the MCMC sample kept for inference.

means: The posterior means of the parameters.

standard.deviations: The posterior standard deviations of the parameters.

correlations: The posterior correlation matrix of the parameters.

quantiles: The posterior quantiles of the parameters.