Package ‘BayMor’

August 22, 2018

Type Package

Version 0.1.0

Date 2018-08-01

Title Bayesian Multivariate Ordinal Regression

Author Seyed M. Miran and Chen Ling

Maintainer Seyed M. Miran sm201@zips.uakron.edu

Description

This package has been created to perform a multivariate ordinal regression using a Bayesian approach. In cases that the response variables of a system are ordinal in nature, (e.g. Likert items), it returns the Bayesian posterior density distributions of the coefficients of explanatory variables in a multivariate regression. After obtaining the distributions in R, a user can simply calculate 95% Highest Density Interval (HDI) for each of the coefficients and if the interval does not include zero, the respective explanatory variable is statistically significant. There are two functions available in this package as follows: “mor” and “rtruncnorm”.

Repository CRAN

License GPL-2

Needs Compilation yes

R topics documented:

Index

`mor` Bayesian Multivariate Ordinal Regression

Description

Returns

Usage

mor(Y, l , X, nx, Nit)

Arguments

Y	$N \times m$ matrix of responses
l	Number of levels responses in each dimension
X	List of explanatory variables of each dimension
nx	Number of explanatory variables in each dimension
Nit	Number of iteration of the MCMC

Guideline

Consider the following multivariate regression example in which a user wants to investigate the effect of the explanatory variables on the ordinal response variables. These are the steps that he/she should take to use "mor" function of the package.

$$\hat{y}_1 = b_{01} + b_{11}x_{11} + b_{21}x_{21} + \cdots + b_{r1}x_{r1} \quad (1)$$
$$\hat{y}_2 = b_{02} + b_{12}x_{12} + b_{22}x_{22} + \cdots + b_{r2}x_{r2} \quad (2)$$
$$\vdots$$
$$\hat{y}_m = b_{0m} + b_{1m}x_{1m} + b_{2m}x_{2m} + \cdots + b_{rm}x_{rm} \quad (m)$$

Step 1: Create a $N \times m$ matrix of responses, Y, where N is the number of observations and m is the number of dimension. Please note that the first column of the matrix must correspond to the first set of observations, equation 1, and the last column to the last set of observations, equation m.

Step 2: Create a vector "l" for the number of levels response variables in equations 1 through m. The first element of the resulting vector must correspond to equation 1 and the last element to equation m.

Step 3: For explanatory variables of each set of observations, create a matrix, $X_1, X_2, \dots, X_m$. X_1 refers to the matrix of explanatory variables for the first equation and X_m is the matrix of explanatory variables for the m equation.

Step 4: Create a list with $X_1, X_2, \dots, X_m$ as $X = list(X_1, X_2, \dots, X_m)$.

Step 5: Create a vector for number of explanatory variables in each of the equations 1 through m. (i.e. $nx = c(r1, r2, \dots, rm)$).

Step 6: Determine Nit, the number of iteration of the MCMC.

Step 7: run the function, determine the burn-in steps, and then either find HDI, or plot the density

Example

```
> Mybeta <- mor(Y,l,X,nx,5000)
> plot(density(Mybeta[500:5000,]))

OR

> hid(Mybeta[500:5000,])          #Requires HDInterval package
```

Index

`rtruncnorm`	Drawing random samples from a truncated normal distribution

This function generate random numbers from a normal distribution with mean μ and standard deviation σ that is truncated to the lower bound l and the upper bound up.

Usage

rtruncnorm(μ, σ, l, up)

Arguments

μ The mean of the normal distribution

σ The standard deviation of the normal distribution

l The lower bound

up The upper bound

Example

```
> rtruncnorm (1,1,0,1)
```