Package ‘Bayesianbetareg’

February 19, 2015

Type Package

Title Bayesian Beta regression: joint mean and precision modeling

License GPL (>= 2)

Version 1.2

Date 2014-07-01

Author The code in R and guide document were prepared by Margarita Marin, Javier Rojas, Daniel Jaimes and Hugo Andres Gutierrez Rojas, under the direction of professor Edilberto Cepeda-Cuervo and with collaboration of Martha Corrales, Maria Fernanda Zarate, Ricardo Duplat and Luis F Villarraga.

Maintainer Margarita Marin <mmarinj@unal.edu.co>

Depends R (>= 2.12.1), mvtnorm, betareg

Description This package performs beta regression

NeedsCompilation no

Repository CRAN

Date/Publication 2014-07-03 20:59:26

R topics documented:

`Bayesianbetareg-package` *Bayesian beta regression package: joint mean and precision modeling*

Description

Bayesian beta regression package

Details

Package:	Bayesianbetareg
Type:	Package
Version:	1.1
Date:	2013-08-31
License:	GPL-2
LazyLoad:	yes

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

`Bayesianbetareg` *Bayesianbetareg*

Description

Function to do Bayesian Beta Regression: joint mean and precision modeling

Usage

```
Bayesianbetareg(Y, X, Z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, graph1, graph2)
```

Arguments

`Y`	object of class matrix, with the dependent variable.
`X`	object of class matrix, with the variables for modelling the mean.
`Z`	object of class matrix, with the variables for modelling the precision.
`nsim`	a number that indicate the number of iterations.
`bpri`	a vector with the initial values of beta.
`Bpri`	a matrix with the initial values of the variance of beta.
`gpri`	a vector with the initial values of gamma.
`Gpri`	a matrix with the initial values of the variance of gamma.
`burn`	a proportion that indicate the number of iterations to be burn at the beginning of the chain.
`jump`	a number that indicate the distance between samples of the autocorrelated the chain, to be excluded from the final chain.
`graph1`	if it is TRUE present the graph of the chains without jump and burn.
`graph2`	if it is TRUE present the graph of the chains with jump and burn.

Details

The bayesian beta regression allow the joint modelling of mean and precision of a beta distributed variable, as is proposed in Cepeda (2001), with logit link for the mean and logarithmic for the precision.

Value

object of class bayesbetareg with:

`coefficients`	object of class matrix with the estimated coefficients of beta and gamma.
`desv`	object of class matrix with the estimated desviations of beta and gamma.
`interv`	object of class matrix with the estimated confidence intervals of beta and gamma.
`fitted.values`	object of class matrix with the fitted values of y.
`residuals`	object of class matrix with the residuals of the regression.
`precision`	object of class matrix with the precision terms of the regression.
`variance`	object of class matrix with the variance terms of the regression.
`beta.mcmc`	object of class matrix with the complete chains for beta.
`gamma.mcmc`	object of class matrix with the complete chains for gamma.
`beta.mcmc.short`	object of class matrix with the chains for beta after the burned process.
`gamma.mcmc.short`	object of class matrix with the chains for gamma after the burned process.
`call`	Call.

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

`BayesianbetaregEst` *Bayesian beta regression*

Description

Performs the Bayesian Beta Regression for joint modelling of mean and precision

Usage

```
BayesianbetaregEst(Y, X, Z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, graph1, graph2)
```

Arguments

`Y`	object of class matrix, with the dependent variable
`X`	object of class matrix, with the variables for modelling the mean
`Z`	object of class matrix, with the variables for modelling the precision
`nsim`	a number that indicate the number of iterations
`bpri`	a vector with the initial values of beta
`Bpri`	a matrix with the initial values of the variance of beta
`gpri`	a vector with the initial values of gamma
`Gpri`	a matrix with the initial values of the variance of gamma
`burn`	a proportion that indicate the number of iterations to be burn at the beginning of the chain
`jump`	a number that indicate the distance between samples of the autocorrelated the chain, to be excluded from the final chain
`graph1`	if it is TRUE present the graph of the chains without jump and burn
`graph2`	if it is TRUE present the graph of the chains with jump and burn

Details

The bayesian beta regression allow the joint modelling of mean and precision of a beta distributed variable, as is proposed in Cepeda (2001), with logit link for the mean and logarithmic for the precision.

Value

object of class `bayesbetareg` with the following:

`Bestimado`	object of class matrix with the estimated coefficients of beta
`Gammaest`	object of class matrix with the estimated coefficients of gamma
`X`	object of class matrix, with the variables for modelling the mean
`Z`	object of class matrix, with the variables for modelling the precision
`DesvBeta`	object of class matrix with the estimated desviations of beta
`DesvGamma`	object of class matrix with the estimated desviations of gamma
`B`	object of class matrix with the B values
`G`	object of class matrix with the G values
`yestimado`	object of class matrix with the fitted values of y
`residuales`	object of class matrix with the residuals of the regression
`phi`	object of class matrix with the precision terms of the regression
`variance`	object of class matrix with the variance terms of the regression
`beta.mcmc`	object of class matrix with the complete chains for beta
`gamma.mcmc`	object of class matrix with the complete chains for gamma
`beta.mcmc.auto`	object of class matrix with the chains for beta after the burned process
`gamma.mcmc.auto`	object of class matrix with the chains for gamma after the burned process

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matem?ticas. Universidade Federal do R?o do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

Examples

```
# Modelation of the gini coeficient with multiples variables

library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)

burn <- 0.3
jump <- 3
nsim <- 400

bpri <- c(0,0,0,0)
Bpri <- diag(100,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0)
Gpri <- diag(10,nrow=ncol(Z),ncol=ncol(Z))

re<-Bayesianbetareg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,0.3,3,graph1=FALSE,graph2=FALSE)
summary(re)
```

`betaresiduals` *Residuals of the Beta Regression*

Description

This function calculates the beta regression residuals

Usage

```
betaresiduals(Y,X, model)
```

Arguments

`Y`	object of class matrix, with the dependent variable
`X`	object of class matrix, with the independent variable
`model`	object of class Bayesianbetareg

Value

`abs`	The raw response residuals
`swr0`	Pearson residuals
`swr1`	standardized weighted residual 1
`swr2`	standardized weighted residual 2
`deviance`	deviance residuals
`cook`	cook residuals
`H`	H matrix H

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro.// //http://www.docentes.unal.edu.co/ece http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

Examples

```
# Modelation of the gini coeficient with multiples variables

library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
```

```
Z <- cbind(X0,X1)

burn <- 0.3
jump <- 3
nsim <- 400

bpri <- c(0,0,0,0)
Bpri <- diag(100,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0)
Gpri <- diag(10,nrow=ncol(Z),ncol=ncol(Z))

re<-Bayesianbetareg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,0.3,3,graph1=FALSE,graph2=FALSE)
summary(re)
reading_skillsresiduals<- betaresiduals(Y,X,re)
```

`criteria` *criteria for comparison the bayesian beta regression*

Description

Performs the comparison criterias for the Bayesian Beta Regression

Usage

```
criteria(X,beta.residuals)
```

Arguments

`X`	object of class matrix, with the independent variable for the mean
`beta.residuals`	object of class bayesbetareg, with the residuals of the Bayesian Beta regression, that can be calculated by the function beta.residuals

Details

This function calculate the residuals of a bayesian beta regression.

Value

`deviance`	the deviance criteria
`AIC`	the AiC criteria
`BIC`	the BIC criteria

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co> Maria Fernanda Zarate <mfzaratej@unal.edu.co> Ricardo Duplat <rrduplatd@unal.edu.co> Luis Villaraga <lfvillarragap@unal.edu.co> Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>,

Examples

```
library(betareg)
data(ReadingSkills)

Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)

burn <- 0.3
jump <- 3
nsim <- 400

bpri <- c(0,0,0,0)
Bpri <- diag(100,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0)
Gpri <- diag(10,nrow=ncol(Z),ncol=ncol(Z))

re<-Bayesianbetareg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,0.3,3,graph1=FALSE,graph2=FALSE)
summary(re)

readingskillsresiduals<- betaresiduals(Y,X,re)

readingskillscriterias <- criteria(X,readingskillsresiduals)
```

`diagnostics` *Plot the residuals of the bayesian beta regression*

Description

Plot the residuals (pearson standarized and deviance), the Cooks distance and the leverage against the predicted values for the Bayesian Beta Regression

Usage

```
diagnostics(model, residuals)
```

Arguments

`model`	object of class bayesbetareg, with the structure of the model
`residuals`	object of class bayesbetareg, with the residuals of the Bayesianbetareg

Value

Plot the residuals of the bayesian beta regression

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

Examples

```
library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)

burn <- 0.3
jump <- 3
nsim <- 400

bpri <- c(0,0,0,0)
Bpri <- diag(100,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0)
Gpri <- diag(10,nrow=ncol(Z),ncol=ncol(Z))

re<-Bayesianbetareg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,0.3,3,graph1=FALSE,graph2=FALSE)
summary(re)

#Example of the function betasresiduals and plots

readingskillsresiduals<- betaresiduals(Y,X,re)
```

```
diagnostics(re,readingskillsresiduals)
```

---

dpostb *Posterior value of beta*

Description

Propose a value for posterior distribution of the beta parameter

Usage

```
dpostb(X, Z, Y, betas, gammas, bpri, Bpri)
```

Arguments

X	object of class matrix, with the variables for modelling the mean
Z	object of class matrix, with the variables for modelling the variance
Y	object of class matrix, with the dependen variables
betas	a vector with the previous proposal beta parameters
gammas	a vector with the previous proposal gamma parameters
bpri	a vector with the initial values of beta
Bpri	a matrix with the initial values of the variance of beta

Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda and Gamerman(2005).

Value

value	a matrix with the proposal for beta

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two parameter exponential family. Estadistica 57, 93 105.

Examples

```
library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
betas.ind=c(0,0,0,0)
gammas.ind=c(0,0)
bpri=c(0,0,0,0)
Bpri=diag(10,nrow=ncol(X),ncol=ncol(X))

beta <- dpostb(X,Z,Y,betas.ind,gammas.ind,bpri,Bpri)
beta
```

---

dpostg *Posterior value of gamma*

Description

Propose a value for posterior distribution of the gamma parameter

Usage

```
dpostg(X, Z, Y, betas, gammas, gpri, Gpri)
```

Arguments

X	object of class matrix, with the variables for modelling the mean
Z	object of class matrix, with the variables for modelling the variance
Y	object of class matrix, with the dependent variables
betas	a vector with the previous proposal beta parameters
gammas	a vector with the previous proposal gamma parameters
gpri	a vector with the initial values of beta
Gpri	a matrix with the initial values of the variance of beta

Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

`value`	a matrix with the proposal for beta

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105.

Examples

```
library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
betas.ind=c(0,0,0,0)
gammas.ind=c(0,0)
bpri=c(0,0)
Bpri=diag(10,nrow=ncol(Z),ncol=ncol(Z))

gamma <- dpostg(X,Z,Y,betas.ind,gammas.ind,bpri,Bpri)
gamma
```

`gammakernel` *the probability of a gamma parameter from the probability density function defined by old parameters*

Description

evaluate the probability of a gamma parameter from the probability density function defined by old parameters

Usage

```
gammakernel(X, Z, Y, gammas.n, betas.v, gammas.v, gpri, Gpri)
```

Arguments

X	object of class matrix, with the variables for modelling the mean
Z	object of class matrix, with the variables for modelling the variance
Y	object of class matrix, with the dependent variable
gammas.n	a vector with the gamma parameter - new parameters - to evaluate in the old p.d.f
betas.v	a vector with the beta that define the old p.d.f
gammas.v	a vector with the gamma that define the old p.d.f
gpri	a vector with the initial values of gamma
Gpri	a matrix with the initial values of the variance of gamma

Details

Evaluate the probability of a gamma parameter from the probability density function defined by old parameters, according with the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

value	a vector with the probability for the gamma parameter from the probability density function defined by old parameters

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105.

Examples

```
# Modelation of the gini coeficient with multiples variables

library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
gammas.n=c(0,0)
betas.v=c(0,0,0,0)
gammas.v=c(0,0)
gpri=c(0,0)
Gpri=diag(10,nrow=ncol(Z),ncol=ncol(Z))

dengamma <- gammakernel(X,Z,Y,gammas.n,betas.v,gammas.v,gpri,Gpri)
dengamma
```

`gammaproposal` *A proposal for gamma parameter*

Description

Propose a value for the gamma parameter

Usage

```
gammaproposal(Y,X, Z, betas, gammas, gpri, Gpri)
```

Arguments

`Y`	object of class matrix, with the dependent variable
`X`	object of class matrix, with the variables for modelling the mean
`Z`	object of class matrix, with the variables for modelling the variance
`betas`	a vector with the previous proposal beta parameters
`gammas`	a vector with the previous proposal gamma parameters
`gpri`	a vector with the initial values of gamma
`Gpri`	a matrix with the initial values of the variance of gamma

Details

Generate a proposal for the gamma parameter according to the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

`value`	a number with the proposal for the gamma parameter

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1.Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep
http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105.

Examples

```
library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
```

```
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
betas.ind=c(0,0,0,0)
gammas.ind=c(0,0)
gpri=c(0,0)
Gpri=diag(10,nrow=ncol(Z),ncol=ncol(Z))

gamma <- gammaproposal(Y,X,Z,betas.ind,gammas.ind,gpri,Gpri)
gamma
```

---

mukernel *the probability of a beta parameter from the probability density function defined by old parameters*

Description

evaluate the probability of a beta parameter from the probability density function defined by old parameters

Usage

```
mukernel(X, Z, Y, betas.n, betas.v, gammas.v, bpri, Bpri)
```

Arguments

X	object of class matrix, with the variables for modelling the mean
Z	object of class matrix, with the variables for modelling the variance
Y	object of class matrix, with the dependent variable
betas.n	a vector with the beta parameter, new parameter, to evaluate in the old p.d.f
betas.v	a vector with the beta that define the old p.d.f
gammas.v	a vector with the gamma that define the old p.d.f
bpri	a vector with the initial values of gamma
Bpri	a matrix with the initial values of the variance of gamma

Details

Evaluate the probability of a beta parameter from the probability density function defined by old parameters, according with the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

value	a matrix with the probability for the beta parameter from the probability density function defined by old parameters

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105.

Examples

```
library(betareg)
data(ReadingSkills)

Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
betas.n=c(0,0,0,0)
betas.v=c(0,0,0,0)
gammas.v=c(0,0)
bpri=c(0,0,0,0)
Bpri=diag(100,nrow=ncol(X),ncol=ncol(X))

denbeta <- mukernel(X,Z,Y,betas.n,betas.v,gammas.v,bpri,Bpri)
denbeta
```

---

mupropsal — *A proposal for beta parameter*

Description

Propose a value for the beta parameter

Usage

```
muproposal(Y,X,Z,betas,gammas,bpri,Bpri)
```

Arguments

`Y`	object of class matrix, with the dependent variable
`X`	object of class matrix, with the variables for modelling the mean
`Z`	object of class matrix, with the variables for modelling the variance
`betas`	a vector with the previous proposal beta parameters
`gammas`	a vector with the previous proposal gamma parameters
`bpri`	a vector with the initial values of beta
`Bpri`	a matrix with the initial values of the variance of beta

Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

`value`	a matrix with the proposal for beta

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Hugo Andres Gutierrez Rojas <hugogutierrez@usantotomas.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro. //http://www.docentes.unal.edu.co/ecep http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105.

Examples

```
library(betareg)
data(ReadingSkills)


Y <- as.matrix(ReadingSkills[,1])
n <- length(Y)
X1 <- as.matrix(ReadingSkills[,2])
for(i in 1:length(X1)){
  X1 <- replace(X1,X1=="yes",1)
```

```
  X1 <- replace(X1,X1=="no",0)
}
X0 <- rep(1, times=n)
X1 <- as.numeric(X1)
X2 <- as.matrix(ReadingSkills[,3])
X3 <- X1*X2
X <- cbind(X0,X1,X2,X3)
Z0 <-  X0
Z <- cbind(X0,X1)
betas.ind=c(0,0,0,0)
gammas.ind=c(0,0)
bpri=c(0,0,0,0)
Bpri=diag(10,nrow=ncol(X),ncol=ncol(X))

beta <- muproposal(Y,X,Z,betas.ind,gammas.ind,bpri,Bpri)
beta
```

---

plotresiduals — *Plot the residuals of the bayesian beta regression*

Description

Plot the residuals (pearson standarized and deviance), the Cooks distance and the leverage against the predicted values for the Bayesian Beta Regression

Usage

```
plotresiduals(X, Y, betaresiduals, type)
```

Arguments

X	object of class matrix, with the independent variable for the mean
Y	object of class matrix, with the dependen variables
betaresiduals	object of class bayesbetareg, with the residuals of the Bayesianbetareg
type	type of residuals: 1. Deviance, 2.Pearson, 3.Standarized Pearson 4. Commun

Value

Plot the residuals of the bayesian beta regression

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

`print.Bayesianbetareg` *print the Bayesian beta regression*

Description

Print the Bayesian Beta Regression for joint modelling of mean and variance

Usage

```
## S3 method for class 'Bayesianbetareg'
print(x,...)
```

Arguments

`x`	object of class Bayesianbetareg
`...`	not used.

Value

print the Bayesian beta regression

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro.// //http://www.docentes.unal.edu.co/ece
http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

print.summary.Bayesianbetareg

print the summary of the Bayesian beta regression

Description

Print the summary Bayesian Beta Regression for joint modelling of mean and variance

Usage

```
## S3 method for class 'summary.Bayesianbetareg'
print(x, ...)
```

Arguments

`x`	object of class Bayesianbetareg
`...`	not used.

Value

Print the summary Bayesian Beta Regression for joint modelling of mean and variance

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro.// //http://www.docentes.unal.edu.co/ece http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

`summary.Bayesianbetareg` *Print the Bayesian beta regression*

Description

Summarized the Bayesian Beta Regression for joint modelling of mean and variance

Usage

```
## S3 method for class 'Bayesianbetareg'
summary(object, ...)
```

Arguments

`object`	an object of class Bayesianbetareg
`...`	not used.

Value

`call`	Call
`coefficients`	Coefficients
`Deviance`	Deviance
`AIC`	AIC
`BIC`	BIC

Author(s)

Daniel Jaimes <dajaimesc@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>, Javier Rojas <jarojasag@unal.edu.co>, Martha Corrales <martha.corrales@usa.edu.co>, Maria Fernanda Zarate <mfzaratej@unal.edu.co>, Ricardo Duplat <rrduplatd@unal.edu.co>, Luis Villaraga <lfvillarragap@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

References

1. Cepeda C. E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matematicas. Universidade Federal do Rio do Janeiro.// //http://www.docentes.unal.edu.co/ece
http://www.bdigital.unal.edu.co/9394/. 2.Cepeda, E. C. and Gamerman D. (2005). Bayesian Methodology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. // 3.Cepeda, E. and Garrido, L. (2011). Bayesian beta regression models: joint mean and precision modeling. Universidad Nacional // 4.Cepeda, E. and Migon, H. and Garrido, L. and Achcar, J. (2012) Generalized Linear models with random effects in the two parameter exponential family. Journal of Statistical Computation and Simulation. 1, 1 13.

Index