Package 'Gammareg'

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Type Package

Title Classic Gamma Regression: Joint Modeling of Mean and Shape Parameters

License GPL (>= 2)

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Depends R (>= 4.0.0)

Description Performs Gamma regression, where both mean and shape parameters follows lineal regression structures.

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Contents

Gammareg-package *classic gamma regression: joint modeling of mean and shape parameters*

Description

Classic gamma regression package

Details

Package:	Gammareg
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Author(s)

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gammahetero1 *Classic gamma regression. Log link for the mean*

Description

Performs the Classic Gamma Regression for joint modeling of mean and shape parameters.

Usage

```
gammahetero1(formula1, formula2)
```

Arguments

formula1	object of class formula. It describes yi and xi for the mean equation of the gamma regression.
formula2	object of class formula. It describes zi for the shape equation of the gamma regression.

Details

The classic gamma regression allow the joint modeling of mean and shape parameters of a gamma distributed variable, as is proposed in Cepeda (2001), using the Fisher Scoring algorithm, with log link for the mean and log link for the shape.

Value

object of class `Gammareg` with the following:

`X`	object of class matrix, with the variables for modelling the mean.
`Z`	object of class matrix, with the variables for modelling the shape.
`beta`	object of class matrix with the estimated coefficients of beta.
`gamma`	object of class matrix with the estimated coefficients of gamma.
`ICB`	object of class matrix with the estimated confidence intervals of beta.
`ICG`	object of class matrix with the estimated confidence intervals of gamma.
`CovarianceMatrixbeta`	object of class matrix with the estimated covariances of beta.
`CovarianceMatrixgamma`	object of class matrix with the estimated covariances of gamma.
`AIC`	the AIC criteria.
`iteration`	numbers of iterations to convergence.
`convergence`	value of convergence obtained.

Author(s)

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References

1. Cepeda-Cuervo, E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matemáticas. Universidade Federal do Río do Janeiro. //http://www.docentes.unal.edu.co/ecepedac/docs/MODELAGEM20DA20VARIABILIDADE.pdf. http://www.bdigital.unal.
2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

Examples

```
# Simulation Example

X1 <- rep(1,500)
X2 <- log(runif(500,0,30))
X3 <- log(runif(500,0,15))
X4 <- log(runif(500,10,20))
mui <- exp(-5 + 0.2*X2 - 0.03*X3)
alphai <- exp(0.2 + 0.1*X2 + 0.3*X4)
Y <- rgamma(500,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
```

```
Z <- cbind(X1,X2,X4)
formula.mean= Y~X2+X3
formula.shape= ~X2+X4
a=gammahetero1(formula.mean,formula.shape)
a
```

---

gammahetero2 *Classic gamma regression. Identity link for the mean*

Description

Performs the Classic Gamma Regression for joint modeling of mean and shape parameters.

Usage

```
gammahetero2(formula1, formula2)
```

Arguments

formula1	object of class formula. It describes yi and xi for the mean equation of the gamma regression.
formula2	object of class formula. It describes zi for the shape equation of the gamma regression.

Details

The classic gamma regression allow the joint modeling of mean and shape parameters of a gamma distributed variable, as is proposed in Cepeda (2001), using the Fisher Scoring algorithm, with log link for the mean and log link for the shape.

Value

object of class Gammareg with the following:

X	object of class matrix, with the variables for modelling the mean.
Z	object of class matrix, with the variables for modelling the shape.
beta	object of class matrix with the estimated coefficients of beta.
gamma	object of class matrix with the estimated coefficients of gamma.
ICB	object of class matrix with the estimated confidence intervals of beta.
ICG	object of class matrix with the estimated confidence intervals of gamma.
CovarianceMatrixbeta	object of class matrix with the estimated covariances of beta.
CovarianceMatrixgamma	object of class matrix with the estimated covariances of gamma.
AIC	the AIC criteria
iteration	numbers of iterations to convergence
convergence	value of convergence obtained

Author(s)

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References

1. Cepeda-Cuervo, E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matemáticas. Universidade Federal do Río do Janeiro. //http://www.docentes.unal.edu.co/ecepedac/docs/MODELAGEM20DA20VARIABILIDADE.pdf. http://www.bdigital.unal.
2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

Examples

```
# Simulation Example

X1 <- rep(1,500)
X2 <- runif(500,0,30)
X3 <- runif(500,0,15)
X4 <- runif(500,10,20)
mui <- 15 + 2*X2 + 3*X3
alphai <- exp(0.2 + 0.1*X2 + 0.3*X4)
Y <- rgamma(500,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
Z <- cbind(X1,X2,X4)
formula.mean= Y~X2+X3
formula.shape= ~X2+X4
a=gammahetero2(formula.mean,formula.shape)
a
```

Gammareg *Gammareg*

Description

Function to do Classic Gamma Regression: joint mean and shape modeling

Usage

```
Gammareg(formula1,formula2,meanlink)
```

Arguments

formula1	object of class matrix, with the dependent variable.
formula2	object of class matrix, with the variables for modelling the mean.
meanlink	links for the mean. The default links is the link log. The link identity is also allowed as admisible value.

Details

The classic gamma regression allow the joint modelling of mean and shape parameters of a gamma distributed variable, as is proposed in Cepeda (2001), using the Fisher Socring algorithm, with two differentes link for the mean: log and identity, and log link for the shape.

Value

object of class bayesbetareg with:

`coefficients`	object of class matrix with the estimated coefficients of beta and gamma.
`desvB`	object of class matrix with the estimated covariances of beta.
`desvG`	object of class matrix with the estimated covariances of gamma.
`interv`	object of class matrix with the estimated confidence intervals of beta and gamma.
`AIC`	the AIC criteria.
`iteration`	numbers of iterations to convergence.
`convergence`	value of convergence obtained.
`call`	Call.

Author(s)

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References

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2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

Examples

```
#

num.killed <- c(7,59,115,149,178,229,5,43,76,4,57,83,6,57,84)
size.sam <- c(1,2,3,3,3,3,rep(1,9))*100
insecticide <- c(4,5,8,10,15,20,2,5,10,2,5,10,2,5,10)
insecticide.2 <- insecticide^2
synergist <- c(rep(0,6),rep(3.9,3),rep(19.5,3),rep(39,3))

par(mfrow=c(2,2))
plot(density(num.killed/size.sam),main="")
boxplot(num.killed/size.sam)
plot(insecticide,num.killed/size.sam)
plot(synergist,num.killed/size.sam)


mean.for  <- (num.killed/size.sam) ~ insecticide  + insecticide.2
```

```
dis.for <-  ~ synergist + insecticide

res=Gammareg(mean.for,dis.for,meanlink="ide")

summary(glm((num.killed/size.sam) ~ insecticide  + insecticide.2,family=Gamma("log")))
summary(res)

# Simulation Example

X1 <- rep(1,500)
X2 <- runif(500,0,30)
X3 <- runif(500,0,15)
X4 <- runif(500,10,20)
mui <- 15 + 2*X2 + 3*X3
alphai <- exp(0.2 + 0.1*X2 + 0.3*X4)
Y <- rgamma(500,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
Z <- cbind(X1,X2,X4)
formula.mean= Y~X2+X3
formula.shape= ~X2+X4
a=Gammareg(formula.mean,formula.shape,meanlink="ide")
summary(a)
```

`print.Gammareg` *print the Classic gamma regression*

Description

Print the Classic Gamma Regression for joint modeling of mean and shape parameters.

Usage

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

Arguments

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

Value

print the Classic gamma regression

Author(s)

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References

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2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

`print.summary.Gammareg`

print the summary of the Classic gamma regression

Description

Print the summary Classic Gamma Regression for joint modelling of mean and shape parameters.

Usage

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

Arguments

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

Value

Print the summary Classic Gamma Regression for joint modelling of mean and shape parameters.

Author(s)

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References

1. Cepeda-Cuervo E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matemáticas. Universidade Federal do Río do Janeiro. //http://www.docentes.unal.edu.co/ecepedac/docs/MODELAGEM20DA20VARIABILIDADE.pdf. http://www.bdigital.unal
2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

summary.Gammareg *Print the Classic gamma regression*

Description

Summarized the Classic gamma regression for joint modelling of mean and shape parameters.

Usage

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

Arguments

object	an object of class Gammareg
...	not used.

Value

call	Call
coefficients	Coefficients
covB	object of class matrix with the estimated covariances of beta.
covG	object of class matrix with the estimated covariances of gamma.
AIC	AIC
iteration	number of iterations
convergence	convergence obtained

Author(s)

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References

1. Cepeda-Cuervo, E. (2001). Modelagem da variabilidade em modelos lineares generalizados. Unpublished Ph.D. tesis. Instituto de Matemáticas. Universidade Federal do Río do Janeiro. //http://www.docentes.unal.edu.co/ecepedac/docs/MODELAGEM20DA20VARIABILIDADE.pdf. http://www.bdigital.unal
2. McCullagh, P. and Nelder, N.A. (1989). Generalized Linear Models. Second Edition. Chapman and Hall.

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