Package ‘ALDqr’

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Title Quantile Regression Using Asymmetric Laplace Distribution

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Depends R (>= 2.15.0)

Imports HyperbolicDist, sn

Description EM algorithm for estimation of parameters and other methods in a quantile regression.

License GPL (>= 3.0)

NeedsCompilation no

Repository CRAN

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Contents

`ais` *Australian institute of sport data*

Description

Data on 102 male and 100 female athletes collected at the Australian Institute of Sport.

Format

This data frame contains the following columns:

Sex (0 = male or 1 = female)

Ht height (cm)

Wt weight (kg)

LBM lean body mass

RCC red cell count

WCC white cell count

Hc Hematocrit

Hg Hemoglobin

Ferr plasma ferritin concentration

BMI body mass index, weight/(height)**2

SSF sum of skin folds

Bfat Percent body fat

Label Case Labels

Sport Sport

References

S. Weisberg (2005). *Applied Linear Regression*, 3rd edition. New York: Wiley, Section 6.4

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diag.qr — *Diagnostics for Quantile Regression Using Asymmetric Laplace Distribution*

Description

Return case-deletion estimating the parameters in a quantile regression

Usage

```
diag.qr(y,x,tau,theta)
```

Arguments

`y`	vector of responses
`x`	the design matrix
`tau`	the quantile to be estimated, this is generally a number strictly between 0 and 1.
`theta`	parameter estimated

Value

Hessian and gradient matrix. Also the generalized cook distance (GDi), approximation of the likelihood distance (QDi)

Author(s)

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References

[1] Koenker, R. W. (2005). Quantile Regression, Cambridge U. Press. [2] Yu, K. & Moyeed, R. (2001). Bayesian quantile regression. Statistics & Probability Letters, 54 (4), 437 to 447. [3] Kotz, S., Kozubowski, T. & Podgorski, K. (2001). The laplace distribution and generalizations: A revisit with applications to communications, economics, engineering, and finance. Number 183. Birkhauser.

Examples

```
## Not run:

################################################################
### Graphic of the generalized Cook distance for data(AIS) ###
################################################################
#Dados
data(ais, package="sn")
attach(ais)
sexInd <- (sex=="female") + 0
x      <- cbind(1,LBM,sexInd)
y      <- BMI


#Percentile
 perc         <- 0.5

res           <- EM.qr(y,x,perc)
diag          <- diag.qr(y,x,perc,res$theta)
HessianMatrix <- diag$MatrizQ
Gradiente     <- diag$mdelta
GDI           <- c()
for (i in 1:202) {
 GDI[i] <- t(Gradiente[,i])
}


#Seccion de los graficos
 par(mfrow = c(1,1))
 plot(seq(1:202),GDI,xlab='Index',ylab=expression(paste(GD[i])),main='p=0.1')
 abline(h=2*(4+1)/202,lty=2)
 identify(GDI,n=1)
```

```
 plot(seq(1:202),GDI,xlab='Index',ylab=expression(paste(GD[i])),main='p=0.5')
 abline(h=2*(4+1)/202,lty=2)
 identify(GDI,n=1)

 plot(seq(1:202),GDI,xlab='Index',ylab=expression(paste(GD[i])),main='p=0.9')
 abline(h=2*(4+1)/202,lty=2)
 identify(GDI,n=4)


############################################################
### Graphic of the likelihood displacemente for data(AIS) ###
############################################################
#Dados
 data(ais, package="sn"); attach(ais); sexInd<-(sex=="female")+0; x=cbind(1,LBM,sexInd); y=BMI

#Percentile
 perc          <- 0.9
 n             <- nrow(x)

 res           <- EM.qr(y,x,perc)

 thetaest      <- res$theta
 sigmaest      <- thetaest[4]
 betaest       <- matrix(thetaest[1:3],3,1)

 taup2         <- (2/(perc*(1-perc)))
 thep       <- (1-2*peGraphic of the generalized Cook distance for data(AIS)rc)/(perc*(1-perc))

 diag          <- diag.qr(y,x,perc,thetaest)

 HessianMatrix <- diag$MatrizQ
 Gradiente     <- diag$mdelta

 sigma         <- sigmaest
 beta          <- betaest

 muc           <- (y-x
 delta2        <- (y-x
 gamma2        <- (2+thep^2/taup2)/sigma

 vchpN         <- besselK(sqrt(delta2*gamma2), 0.5-1)
                  /(besselK(sqrt(delta2*gamma2), 0.5))*(sqrt(delta2/gamma2))^(-1)
 vchp1         <- besselK(sqrt(delta2*gamma2), 0.5+1)
                  /(besselK(sqrt(delta2*gamma2), 0.5))*(sqrt(delta2/gamma2))

 Q             <- -0.5*n*log(sigmaest)-0.5*(sigmaest*taup2)^{-1}*
                  (sum(vchpN*muc^2 - 2*muc*thep + vchp1*(thep^2+2*taup2)))
 #######################################################
 theta_i       <- thetaest
 sigmaest      <- theta_i[4,]
 betaest       <- theta_i[1:3,]
 sigma         <- sigmaest
 beta          <- betaest
```

```
 muc          <- (y-x

 delta2       <- (y-x
 gamma2       <- (2+thep^2/taup2)/sigma

 vchpN        <- besselK(sqrt(delta2*gamma2), 0.5-1)
                 /(besselK(sqrt(delta2*gamma2), 0.5))*(sqrt(delta2/gamma2))^(-1)
 vchp1        <- besselK(sqrt(delta2*gamma2), 0.5+1)
                 /(besselK(sqrt(delta2*gamma2), 0.5))*(sqrt(delta2/gamma2))

 Q1 <- c()
 for (i in 1:202)
 {
   Q1[i] <- -0.5*n*log(sigmaest[i])-sum(vchpN[,i]*muc[,i]^2 - 2*muc[,i]*thep
     + vchp1[,i]*(thep^2+2*taup2))/(2*(sigmaest[i]*taup2))
 }

 ########################################################
 QDi <- 2*(-Q+Q1)

 #Depois de escolger perc guardamos os valores de  QDi
 QDi0.1 <- QDi
 QDi0.5 <- QDi
 QDi0.9 <- QDi

#Seccion de los graficos
 par(mfrow = c(1,1))
 plot(seq(1:202),QDi0.1,xlab='Index',ylab=expression(paste(QD[i])),main='p=0.1')
 abline(h=mean(QDi0.1)+3.5*sd(QDi0.1),lty=2)
 identify(QDi0.1,n=3)

 plot(seq(1:202),QDi0.5,xlab='Index',ylab=expression(paste(QD[i])),main='p=0.5')
 abline(h=mean(QDi0.5)+3.5*sd(QDi0.5),lty=2)
 identify(QDi0.5,n=3)

 plot(seq(1:202),QDi0.9,xlab='Index',ylab=expression(paste(QD[i])),main='p=0.9')
 abline(h=mean(QDi0.9)+3.5*sd(QDi0.9),lty=2)
 identify(QDi0.9,n=4)

## End(Not run)
```

EM.qr *Quantile Regression Using Asymmetric Laplace Distribution*

Description

Return estimating the parameters in a quantile regression

Usage

```
EM.qr(y, x = NULL, tau = NULL, error = 0.000001 , iter = 2000, envelope=FALSE)
```

Arguments

`y`	vector of responses
`x`	the design matrix
`tau`	the quantile to be estimated, this is generally a number strictly between 0 and 1.
`error`	the covergence maximum error
`iter`	maximum iterations of the EM algorithm.
`envelope`	confidence envelopes for a curve based on bootstrap replicates

Value

Estimated parameter for a quantile regression fit,standard error, log-likelihood.

Author(s)

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References

[1] Koenker, R. W. (2005). Quantile Regression, Cambridge U. Press.

[2] Yu, K. & Moyeed, R. (2001). Bayesian quantile regression. Statistics & Probability Letters, 54 (4), 437 to 447.

[3] Kotz, S., Kozubowski, T. & Podgorski, K. (2001). The laplace distribution and generalizations: A revisit with applications to communications, economics, engineering, and finance. Number 183. Birkhauser.

Examples

```
data(ais, package="sn")
attach(ais)
sexInd <- (sex=="female") + 0
x      <- cbind(1,LBM,sexInd)
y      <- BMI
tau    <- 0.5

## EM.qr
EM.qr(y,x,tau)
```

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