Package 'nlsmsn'

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Title Fitting Nonlinear Models with Scale Mixture of Skew-Normal Distributions

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Version 0.0-5

Description Fit univariate non-linear scale mixture of skew-normal(NL-SMSN) regression, details in Garay, Lachos and Abanto-Valle (2011) <doi.org/10.1016/j.jkss.2010.08.003> and Lachos, Bandyopadhyay and Garay (2011) <doi.org/10.1016/j.spl.2011.03.019>.

Depends R (>= 2.10.0)

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Repository CRAN

NeedsCompilation no

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R topics documented:

`Oil` *Oil palm yield*

Description

Growth and yield of palm oil

Usage

```
data(Oil)
```

Format

A data frame with 19 observations of oil characteristics

Author(s)

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Source

Aldo M. Garay, Victor H. Lachos, Carlos A. Abanto-Valle (2011). "Nonlinear regression models based on scale mixture of skew-normal distributions". *Journal of the Korean Stastical Society*, 40, 115-124.

Examples

```
## Not run:
##Load the data
data(Oil)

##Define non linear function
nlf<-function(x,betas){
resp<- betas[1]/(1 +betas[2]*exp(-betas[3]*x))
return(resp)
}

##Set the response y and covariate x
y <- Oil$y
x <- Oil$x

##Set initial values
betas <- c(37,4.81,0.78)
sigma2 <- 2.95
shape <- -2
nu <- 3

## Skew.normal regression
analysis.sn <- smsn.nl(y=y, x=x, betas=betas, sigma2=sigma2,
                       shape = shape, nlf = nlf, criteria = TRUE,
                       family = "Skew.normal", iter.max = 200)

## Skew.t regression
analysis.st <- smsn.nl(y=y, x=x, betas=betas, sigma2=sigma2, shape = shape,
                       nu = nu, nlf = nlf, criteria = TRUE,
                       family = "Skew.t", iter.max = 200)

## End(Not run)
```

smsn.nl *Fit univariate NL-SMSN regression*

Description

Return EM algorithm output for NL-SMSN regression for both "Homoscedastic" and "Heteroscedastic" (univaritate case, p=1).

Usage

```
smsn.nl(y, x = NULL, z = NULL, betas = NULL, sigma2 = NULL,
shape = NULL, rho = NULL,
nu = NULL, nlf = NULL, rho.func = 1,
reg.type = "Homoscedastic", criteria = FALSE,
family = "Skew.t", error = 1e-05, iter.max = 100)
```

Arguments

y	the response vector
x	the independent covariates
z	the independent covariates for sigma2. "Heteroscedastic" model ONLY!
betas	regression coefficient(s) vector
sigma2	initial value for the scale parameter
shape	initial value for the skewness parameter
rho	initial value for "Heteroscedastic" coefficient rho. "Heteroscedastic" model ONLY!
nu	the parameter of the scale variable (vector or scalar) of the SMSN family (kurtosis parameter). For the "Skew.cn" must be a vector of length 2 and values in (0,1)
nlf	non linear function for the regression
rho.func	Choose the type of heteroscedasticity for sigma2. If rho.func == 1 (f(z,rho) = exp(z*rho)) and rho.func == 2 (f(z,rho) = z^rho).
reg.type	the type of possible regression: "Homoscedastic" or "Ho"; "Heteroscedastic" or "He".
criteria	if TRUE, loglik, AIC, BIC will be calculated
family	distribution famility to be used in fitting ("t", "Skew.t", "Skew.cn", "Skew.slash", "Skew.normal", "Normal")
error	the covergence maximum error
iter.max	maximum iterations of the EM algorithm

Value

Estimated values of the location, scale, skewness, regression coefficients and "Heteroscedastic" coefficient (when reg.type = "He").

Author(s)

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References

Aldo M. Garay, Victor H. Lachos, Carlos A. Abanto-Valle (2011). "Nonlinear regression models based on scale mixture of skew-normal distributions". *Journal of the Korean Stastical Society*, 40, 115-124.\

Victor H. Lachos, Dipankar Bandyopadhyay and Aldo M. Garay (2011). "Heteroscedastic nonlinear regression models based on scale mixture of skew-normal distributions". *Statistics -and Probability Letters*, 81, 1208-1217.

Examples

```
##see examples in \code{\link{Oil}} and \code{\link{Ultrasonic}}
```

Ultrasonic *Ultrasonic Calibration*

Description

The data is a result of a ultrasonic calibration study perfomed by National Institute of Standard and Technology.

Usage

```
data(Ultrasonic)
```

Format

A data frame with 214 observations with y as the ultrasonic measuraments and x the metal distance

Author(s)

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Source

Victor H. Lachos, Dipankar Bandyopadhyay and Aldo M. Garay (2011). "Heteroscedastic nonlinear regression models based on scale mixture of skew-normal distributions". *Statistics -and Probability Letters*, 81, 1208-1217.

Examples

```
## Not run:
##Load the data
data(Ultrasonic)

##Define non linear function
nlf<-function(x,betas){
resp<- exp(-betas[1]*x)/(betas[2] + betas[3]*x)
return(resp)
}

##Set the response y and covariate x
y <- Ultrasonic$y
x <- Ultrasonic$x

##Set initial values
z <- x
betas <- c(0.1913, 0.0061, 0.0110)
rho <- -0.1
sigma2 <- 3.2726
shape <- 0.1698
nu <- 4

## Skew.normal regression
analysis.sn <- smsn.nl(y = y, x = x, z = z, betas = betas, sigma2 = sigma2, shape = shape,
                       rho = rho, nlf = nlf, rho.func = 2, reg.type = "Heteroscedastic",
                       criteria = TRUE, family = "Skew.normal", iter.max = 200)

## Skew.t regression
analysis.st <- smsn.nl(y = y, x = x, z = z, betas = betas, sigma2 = sigma2, shape = shape, nu = nu,
                       rho = rho, nlf = nlf, rho.func = 1, reg.type = "He",
                       criteria = TRUE, family = "Skew.t", iter.max = 200)

## End(Not run)
```

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