

Package ‘cthreshER’

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Type Package

Title Continuous Threshold Expectile Regression

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Description Estimation and inference methods for the continuous threshold expectile regression. It can fit the continuous threshold expectile regression and test the existence of change point, for the paper, “Feipeng Zhang and Qunhua Li (2016). A continuous threshold expectile regression, submitted.”

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LazyData TRUE

RoxygenNote 5.0.1

Depends R (>= 3.1.0), Matrix

URL <https://arxiv.org/abs/1611.02609>

NeedsCompilation no

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 cterFit

Fit the continuous threshold expectile regression

Description

The grid search algorithm for the continuous threshold expectile regression

Usage

```
cterFit(y, x, z, tau = 0.5, max.iter = 100, tol = 1e-04)
```

Arguments

y	A vector of response
x	A scalar covariate with threshold
z	A vector of covariates
tau	the expectile level, 0.5 for default
max.iter	the maximum iteration steps, 100 for default
tol	tolerance value, 1e-4 for default

Value

A list with the elements

coef.est	The estimated regression coefficients with intercept.
threshold.est	The estimated threshold.
coef.se	The estimated standard error of the regression coefficients.
threshold.se	The estimated standard error of the threshold.
iter	The iteration steps.

Author(s)

Feipeng Zhang and Qunhua Li

Examples

```
## simulated data
ptm <- proc.time()
n <- 200
t0 <- 1.5
bet0 <- c(1, 3, -2, 1)
tau <- 0.3
modtype <- 1
errtype <- 1
```

```

dat <- cterSimData(n, bet0, t0, tau, modtype, errtype)
y <- dat[, 1]
x <- dat[, 2]
z <- dat[, 3]
fit <- cterFit(y, x, z, tau)

## The example of Baseball pitcher salary
data(data_bbsalaries)
y <- data_bbsalaries$y
x <- data_bbsalaries$x
z <- NULL
tau <- 0.5
fit <- cterFit(y, x, z, tau)
proc.time() - ptm

```

cterSimData

Simulated data from the continuous threshold expectile regression

Description

The function for simulating data from the continuous threshold expectile regression

Usage

```
cterSimData(n, bet0, t0, tau = 0.5, modtype = 1, errtype = 1)
```

Arguments

n	sample size.
bet0	the vecotr of true regression coefficients.
t0	the true location of threshold.
tau	the expectile level, 0.5 for default.
modtype	type of model, 1 = IID for default, 2 = Heteroscedasticity, modtype = 1, $Y = beta_0 + beta_1X + beta_2(X - t)_+gammaZ + e$, modtype = 1, $Y = beta_0 + beta_1X + beta_2(X - t)_+gammaZ + (1 + 0.2Z)e$,
errtype	type of error, 1 for default, errtype = 1 for $N(0, 1)$, errtype = 2 for t_4 , errtype = 3 for $0.9 N(0, 1) + 0.1 t_4$.

Value

A matrix with the elements

y	The response variable.
x	The scalar covariate with threshold.
z	A vector of covariates.

Author(s)

Feipeng Zhang and Qunhua Li

Examples

```
## simulated data
ptm <- proc.time()
n <- 200
t0 <- 1.5
bet0 <- c(1, 3, -2, 1)
tau <- 0.5
modtype <- 1
errtype <- 1
dat <- cterSimData(n, bet0, t0, tau, modtype, errtype)
head(dat)
proc.time() - ptm
```

cterTest	<i>test the existence of change point in the continuous threshold expectile regression</i>
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Description

This function for calculating the test statistics and p-value by wild bootstrap.

Usage

```
cterTest(y, x, z, tau = 0.5, NB = 1000)
```

Arguments

y	A vector of response
x	A scalar covariate with threshold
z	A vector of covariates
tau	the expectile level, 0.5 for default
NB	resampling times, 1000 for default

Value

A list with the elements

Tn	The statistic based on original data.
Tn.NB	The statistics by wild bootstrap.
p.value	The p-value by wild bootstrap.

Author(s)

Feipeng Zhang and Qunhua Li

Examples

```
## simulated data
ptm <- proc.time()
set.seed(1)
n <- 200
t0 <- 1.5
bet0 <- c(1, 3, 0, 1)
tau <- 0.3
modtype <- 1
errtype <- 1
dat <- cterSimData(n, bet0, t0, tau, modtype, errtype)
y <- dat[, 1]
x <- dat[, 2]
z <- dat[, 3]
fit.test <- cterTest(y, x, z, tau, NB = 30)
fit.test$p.value

## The example of Baseball pitcher salary
data(data_bbsalaries)
y <- data_bbsalaries$y
x <- data_bbsalaries$x
z <- NULL
tau <- 0.5
fit.test <- cterTest(y, x, z, tau, NB = 30)
fit.test$p.value
proc.time() - ptm
```

data_bbsalaries	<i>Baseball pitcher salary data</i>
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Description

Salaries of 176 piters for the 1987 season. The variables are as follows:

Usage

```
data(data_bbsalaries)
```

Format

A data frame with 176 observations on the following 2 variables.

- y Log of the base salary in dollars
- x Log of the number of years experience

Source

Hettmansperger, T.P. and McKean J.W. (2011), Robust Nonparametric Statistical Methods, 2nd ed., New York: Chapman-Hall.

References

Hettmansperger, T.P. and McKean J.W. (2011), Robust Nonparametric Statistical Methods, 2nd ed., New York: Chapman-Hall.

Examples

```
data(data_bbsalaries)
## maybe str(data_bbsalaries) ; plot(data_bbsalaries) ...
```

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