Package 'Rbent'

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Type Package

Title Robust Bent Line Regression

Version 0.1.0

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Description An implementation of robust bent line regression. It can fit the bent line regression and test the existence of change point,
for the paper, ``Feipeng Zhang and Qunhua Li (2016). Robust bent line regression, submitted."

License GPL (>= 2.0)

LazyData TRUE

RoxygenNote 5.0.1

Depends R (>= 3.1.0), Rfit

URL http://arxiv.org/abs/1606.02234

NeedsCompilation no

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Repository CRAN

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Contents

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data_mrs *MRS data*

Description

A dataset containing the mass, speed and hopper indicator for land animals. The variables are as follows:

Usage

```
data(data_mrs)
```

Format

A data frame with 107 rows and 3 variables

mass the mass of animals

speed the speed of animals

hopper the indicator variabel of hoppers

Source

Garland, T.(1983).

References

- Garland, T.(1983). The relation between maximal running speed and body mass in terrestrial mammals. Journal of Zoology 199, 157–170.

Examples

```
## Not run:
data(data_mrs)
summary(data_mrs)

## End(Not run)
```

`data_transport`	*bedload transport data*

Description

A dataset containing the discharge, the bedload transport rate The variables are as follows:

Usage

```
data(data_transport)
```

Format

A data frame with 76 rows and 2 variables

x the discharge (cubic meters/second)

y the bedload transport rate (kilograms/second)

Source

Ryan, S., Porth, L., Troendle, C. (2002).

References

- Ryan, S., Porth, L., Troendle, C. (2002). Defining phases of bedload transport using piecewise regression. Earth Surface Processes and Landforms 27, 971–990.
- Ryan, S., Porth, L. (2007). A tutorial on the piecewise regression approach applied to bedload transport data. US Department of Agriculture, Forest Service, Rocky Mountain Research Station Fort Collins, CO, 1–41.

Examples

```
data(data_transport)
summary(data_transport)
```

`rbentfit`	*rank estimation for bent line regression*

Description

This function use Wilcoxon score functions for fitting the bent line regression model.

Usage

```
rbentfit(y, z, x, bet.ini, tau.ini, tol = 1e-04, max.iter = 50)
```

Arguments

y	A vector of response
z	A vector of covariates
x	A numeric variable with change point
bet.ini	A initial vector of regression coefficients
tau.ini	A initial value of change point
tol	tolerance value, 1e-4 for default
max.iter	the maximum iteration steps

Value

A list with the elements

est	The estimated regression coefficients with intercept.
bp	The estimated change point.
est.se	The estimated standard error of the regression coefficients.
bp.est	The estimated standard error of the change point.
iter	The iteration steps.

Author(s)

Feipeng Zhang

Examples

```
n <- 150
x <- runif(n, 0, 4)
z <- rnorm(n, 1, 1)
y <- 1 + 0.5*z + 1.5*x  - 3 *pmax(x-2, 0)  + rt(n, 2)
rbentfit(y, cbind(1,z), x, bet.ini = c(0, 1, 1, -2), tau.ini = 1)

# for the example of  MRS data
data(data_mrs)
x <- log(data_mrs$mass)
y <- log(data_mrs$speed)
z <- data_mrs$hopper
tau.ini <- 3
dat.new <- data.frame(y=y, z1=z, z2 = x, z3=pmax(x-tau.ini,0))
library(Rfit)
fit.ini <- rfit(y~ z1 + z2 +z3, data= dat.new)   # with intercept
bet.ini <- fit.ini$coef
fit.rank <- rbentfit(y, cbind(1,z), x, bet.ini, tau.ini)
```

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rbenttest *test the existence of change point in the bent line regression*

Description

This function use Wilcoxon score functions for calculating the test statistics and p-value by wild bootstrap.

Usage

```
rbenttest(y, z, x, NB = 1000, myseed = 1)
```

Arguments

y	A vector of response
z	A vector of covariates
x	A numeric variable with change point
NB	resampling times
myseed	set seed

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

Examples

```
# for the example of  MRS data
data(data_mrs)
x <- log(data_mrs$mass)
y <- log(data_mrs$speed)
z <- data_mrs$hopper
p.value <- rbenttest(y, cbind(1, z), x, NB = 50)$p.value

# for the example of bedload transport data
data(data_transport)
x <- data_transport$x
y <- data_transport$y
p.value <- rbenttest(y, 1, x, NB = 50)$p.value
```

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