

Package ‘Rbent’

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Type Package

Title Robust Bent Line Regression

Version 0.1.0

Maintainer Feipeng Zhang <zhangfp108@gmail.com>

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

Author Feipeng Zhang [cre],
Qunhua Li [aut]

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data_mrs	<i>MRS data</i>
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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	<i>bedload transport data</i>
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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	<i>rank estimation for bent line regression</i>
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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

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

Value

A list with the elements

<code>est</code>	The estimated regression coefficients with intercept.
<code>bp</code>	The estimated change point.
<code>est.se</code>	The estimated standard error of the regression coefficients.
<code>bp.est</code>	The estimated standard error of the change point.
<code>iter</code>	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)
```

rbenttest	<i>test the existence of change point in the bent line regression</i>
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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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