Package ‘siqr’

October 14, 2022

Type Package

Title An R Package for Single-Index Quantile Regression

Version 0.8.1

Language en-US

Description Single-Index Quantile Regression is effective in some scenarios. We provides functions that allow users to fit Single-Index Quantile Regression model. It also provides functions to do prediction, estimate standard errors of the single-index coefficients via bootstrap, and visualize the estimated univariate function. Please see W., Y., Y. (2010) <doi:10.1016/j.jmva.2010.02.003> for details.

License GPL-3

Encoding UTF-8

Depends R (>= 3.6.0)

Imports stats, quantreg, KernSmooth

RoxygenNote 7.1.2

NeedsCompilation no

Author Tianhai Zu [cre],
Yan Yu [aut]

Maintainer Tianhai Zu <zuti@mail.uc.edu>

Repository CRAN

Date/Publication 2021-12-14 20:30:02 UTC

R topics documented:

generate.data

Data generation function for simulation and demonstration There are three settings.

Description

Data generation function for simulation and demonstration There are three settings.

Usage

```
generate.data(
  n,
  true.theta = NULL,
  sigma = 0.1,
  setting = "setting1",
  ncopy = 1
)
```

Arguments

`n`	sample size
`true.theta`	true single-index coefficients, default is c(1,1,1)/sqrt(3) for setting 1 and c(1,2)/sqrt(5) for other settings
`sigma`	the standard deviation of error term
`setting`	chose from three settings
`ncopy`	generates multiple copies of data for Monte Carlo simulations

Value

X predictors

Y response variables

single.index.values single index term

lprq0

A supporting function that return the local polynomial regression quantile. This estimates the quantile and its derivative at the point x.0

Description

A supporting function that return the local polynomial regression quantile. This estimates the quantile and its derivative at the point x.0

Usage

```
lprq0(x, y, h, tau = 0.5, x0)
```

Arguments

`x`	covariate sequence;
`y`	response sequence;
`h`	bandwidth(scalar);
`tau`	- left-tail probability
`x0`	point at which the quantile is estimated

Value

x0 a scalar

fv quantile est; dv - quantile derivative est

`plot.siqr` *plot function of siqr*

Description

plot function of siqr

Usage

```
## S3 method for class 'siqr'
plot(x, ..., bootstrap.interval = FALSE)
```

Arguments

`x`	The SIQR model object
`...`	optional arguments
`bootstrap.interval`	whether to calculate and plot bootstrap interval

Value

None

siqr — *Main estimation function of single index quantile regression model. a two step method.*

Description

Main estimation function of single index quantile regression model. a two step method.

Usage

```
siqr(y, X, tau = 0.5, beta.initial = NULL, h = NULL, maxiter = 30, tol = 1e-08)
```

Arguments

`y`	response vector;
`X`	covariate matrix;
`tau`	left-tail probability (quantile index), scalar
`beta.initial`	starting value of beta, the single index coefficients
`h`	user-defined bandwidth
`maxiter`	max iteration number
`tol`	toleration for convergence

Value

a siqr object, which includes: beta - the fitted single index coefficients with unit norm and first component being non negative flag.conv - whether the iterations converge

Examples

```
#generate data
set.seed(2021)
data <- generate.data(50)
X <- data$X
y0<- data$Y

#initials
beta0 <- NULL
#quantile
tau = 0.75
siqr.result <- siqr(y0,X,beta.initial = beta0, tau=tau)
summary(siqr.result)
```

`summary.siqr` *Function to print summary*

Description

Function to print summary

Usage

```
## S3 method for class 'siqr'
summary(
  object,
  digits = max(5, getOption("digits") - 3),
  signif.stars = getOption("show.signif.stars"),
  ...
)
```

Arguments

`object`	the single index quantile regression model object
`digits`	controls digits in output
`signif.stars`	whether show the significance stars
`...`	extra arguments

Value

the summarized information object

Index