

Package ‘sigr’

July 23, 2025

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](https://doi.org/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

Contents

generate.data	2
lprq0	2
plot.sigr	3
sigr	4
summary.sigr	5

Index	6
--------------	----------

generate.data	<i>Data generation function for simulation and demonstration There are three settings.</i>
---------------	--

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

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

<code>plot.siqr</code>	<i>plot function of siqr</i>
------------------------	------------------------------

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	<i>Main estimation function of single index quantile regression model. a two step method.</i>
------	---

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	<i>Function to print summary</i>
--------------	----------------------------------

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

`generate.data`, 2

`lprq0`, 2

`plot.siqr`, 3

`siqr`, 4

`summary.siqr`, 5