

# Package ‘sigr’

December 14, 2021

**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](mailto:zuti@mail.uc.edu)>

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

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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>
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### 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

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

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siqr	<i>Main estimation function of single index quantile regression model. a two step method.</i>
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### 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)
```

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summary.siqr	<i>Function to print summary</i>
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**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

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