Package ‘BwQuant’

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Title Bandwidth Selectors for Local Linear Quantile Regression
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Description Bandwidth selectors for local linear quantile regression, including cross-validation and plug-in methods. The local linear quantile regression estimate is also implemented.
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Description

The R package BwQuant implements different bandwidth selectors for local linear quantile regression, including selectors based on rule of thumb, plug-in and cross-validation techniques.

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bwCV

Computing the cross-validation bandwidth proposed by Abberger (1998)

Description

Function to compute a bandwidth for local linear quantile regression following the cross-validation criteria presented by Abberger (1998).

Usage

bwCV(x, y, hseq, tau)

Arguments

x numeric vector of x data.
y numeric vector of y data. This must be the same length as x.
hseq sequence of values where the cross-validation function will be evaluated.
tau the quantile order where the regression function is to be estimated. It must be a number strictly between 0 and 1.

Details

The cross-validation function is evaluated at each element of hseq. Then, the cross-validation selector will be the element of hseq that minimizes the cross-validation function.

Value

Returns a number with the chosen bandwidth.
Author(s)
Mercedes Conde-Amboage and Cesar Sanchez-Sellero.

References

See Also
The obtained bandwidth can be used in the function `llqr` to produce a local linear estimate of the \( \tau \)-quantile regression function.

Examples
```r
set.seed(1234)
x=runif(100)
y=10*(x^4+x^2-x)+rexp(100)
hseq=seq(0.05,0.8,length=21)
tau=0.25
bwCV(x,y,hseq,tau)
```

Description
Function to compute a bandwidth selector for local linear quantile regression following the plug-in rule proposed in Section 2.2 of Conde-Amboage and Sanchez-Sellero (2018).

Usage
```r
bwPI(x, y, tau)
```

Arguments
- `x` numeric vector of \( x \) data.
- `y` numeric vector of \( y \) data. This must be the same length as \( x \).
- `tau` the quantile order where the regression function is to be estimated. It must be a number strictly between 0 and 1.

Value
Returns a bandwidth for a local linear estimate of the \( \tau \)-quantile regression function.
Author(s)
Mercedes Conde-Amboage and Cesar Sanchez-Sellero.

References

See Also
The obtained bandwidth can be used in the function 11qr to produce a local linear estimate of the tau-quantile regression function.

Examples
set.seed(1234)
x=runif(100)
y=10*(x^4+x^2-x)+rexp(100)
tau=0.25
bwPI(x,y,tau)

bwRT Computing a bandwidth using a rule of thumb

Description
Function to compute a bandwidth selector for local linear quantile regression following the rule of thumb presented in Section 2.1 of Conde-Amboage and Sanchez-Sellero (2018).

Usage
bwRT(x, y, tau)

Arguments
x numeric vector of x data.
y numeric vector of y data. This must be the same length as x.
tau the quantile order where the regression function is to be estimated. It must be a number strictly between 0 and 1.

Value
Returns a bandwidth for a local linear estimate of the tau-quantile regression function.

Author(s)
Mercedes Conde-Amboage and Cesar Sanchez-Sellero.
References


See Also

The obtained bandwidth can be used in the function `llqr` to produce a local linear estimate of the tau-quantile regression function.

Examples

```r
set.seed(1234)
x=runif(100)
y=10*(x^4+x^2-x)+rexp(100)
tau=0.25
bwRT(x,y,tau)
```

Description

Function to compute a bandwidth selector for local linear quantile regression following the plug-in rule proposed by Yu and Jones (1998).

Usage

`bwYJ(x, y, tau)`

Arguments

- `x` numeric vector of x data.
- `y` numeric vector of y data. This must be the same length as x.
- `tau` the quantile order where the regression function is to be estimated. It must be a number strictly between 0 and 1.

Value

Returns a bandwidth for a local linear estimate of the tau-quantile regression function.

Author(s)

Mercedes Conde-Amboage and Cesar Sanchez-Sellero.
References


See Also

The obtained bandwidth can be used in the function `llqr` to produce a local linear estimate of the \( \tau \)-quantile regression function.

Examples

```r
set.seed(1234)
x=runif(100)
y=10*(x^4+x^2-x)+rexp(100)
tau=0.25
bwYJ(x,y,tau)
```

llqr  

_Fitting a local linear quantile regression model_

Description

Function that estimates the quantile regression function using a local linear kernel smoother.

Usage

```r
llqr(x, y, tau, t, h)
```

Arguments

- **x**: numeric vector of \( x \) data.
- **y**: numeric vector of \( y \) data. This must be the same length as \( x \).
- **tau**: the quantile order where the regression function is to be estimated. It must be a number strictly between 0 and 1.
- **t**: the values of \( x \) at which the quantile regression model is to be estimated.
- **h**: the bandwidth parameter.

Value

A list with the following components:

- **x.values**: the given points at which the evaluation occurs.
- **y.values**: the estimated values of the quantile regression function at the given \( x \).values.
Author(s)
Mercedes Conde-Amboage and Cesar Sanchez-Sellero.

References

See Also
The argument h with the bandwidth parameter can be fixed to some arbitrary value or chosen by one of the procedures implemented in the functions `bwCV`, `bwPI`, `bwRT` or `bwYJ`.

Examples
```r
set.seed(1234)
x=runif(100)
y=10*(x^4+x^2-x)+rexp(100)
tau=0.25
h=bwPI(x,y,tau)
t=seq(0,1,length=101)
m=llqr(x,y,tau,t,h)
plot(x,y)
lines(m$x.values,m$y.values)
```
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