Package ‘ICE’

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R topics documented:

bickde ................................................................. 2
ICGG ................................................................. 3
ICHemophiliac ....................................................... 3
ickde ................................................................. 4
iclde ................................................................. 5
iclopcpoly .......................................................... 6
inmost ............................................................... 7
likelihoodcv ......................................................... 7
motor.IC ............................................................ 8

Index 9
**bickde**  

*Bandwidth choice for Interval-Censored Kernel Density Estimation*

**Description**

Likelihood Cross-Validation bandwidth choice for interval-censored kernel density estimates. Also computed is the direct-plug-in estimate (using the KernSmooth function dpik based on the interval midpoints.

**Usage**

`bickde(data, factor)`

**Arguments**

- `data`  
  A matrix with two columns, consisting of left and right endpoints of the interval

- `factor`  
  A scalar factor which gives upper and lower bounds for the initial interval for the golden section search relative to a preliminary value computed by dpik. Default value is 10 which specifies an initial interval of (dpik/10, dpik*10).

**Details**

Maximization of the likelihood is accomplished by golden section search using the `optimize()` function. This can be very SLOW.

**Value**

A scalar value.

**Author(s)**

W.J. Braun

**References**


**Examples**

```
# Not run
# bickde(ICHemophiliac)
```
ICGG

Gentleman and Geyer's Data

Description

Gentleman and Geyer's Data.

Usage

data(ICGG)

Format

A data frame with 6 observations on the following 2 variables.

- left: the left interval endpoint
- right: the right interval endpoint

Source


Examples

```r
library(KernSmooth)
tmp <- apply(ICGG, 1, mean)  # tmp now contains the interval midpoints
h <- dpik(tmp)               # direct-plug-in bandwidth selected for
                            # interval midpoints
par(mfrow=c(1,2))
estimate <- ickde(ICGG, h=h, m=200)
plot(estimate, type="l", main="One fixed point")
estimate <- ickde(ICGG, f=c(rep(1,60),rep(0,90),rep(1,60)), h=.1)
plot(estimate, type="l", main="Another fixed point")
```

ICHemophiliac

Hemophiliac Data Set

Description

Time (interval-censored) to onset of HIV infection.

Usage

data(ICHemophiliac)
Format

A matrix with 2 columns. The first column contains the left endpoints of the intervals, and the second column contains the right endpoints.

Description

Iterated conditional expectation kernel density estimation using a local constant. The bandwidth is assumed fixed. (See the example for a way to get a quick ballpark estimate of the bandwidth.) The gaussian, epanechnikov and biweight kernels can be used. Note that the bandwidth estimate would have to be adjusted before using with epanechnikov or biweight.

Usage

\texttt{ickde(I, h, f, m, n.iterations = 10, x1, xm, right.limit = 10000, kernel="gaussian", old=TRUE)}

Arguments

\texttt{I} A matrix with two columns, consisting of left and right endpoints of the interval data
\texttt{h} A scalar bandwidth
\texttt{f} An initial estimate of the density at a sequence of grid points (optional; if this is used, do not specify \texttt{m})
\texttt{m} The number of (equally-spaced) grid points at which the density is to be estimated
\texttt{n.iterations} The maximum number of iterations allowed
\texttt{x1} The left-most grid point (optional)
\texttt{xm} The right-most grid point (optional)
\texttt{right.limit} For right-censored data, the value to be used as an artificial right endpoint for the intervals
\texttt{kernel} character argument indicated choice of kernel; current choices are "gaussian", "epanechnikov", "biweight"
\texttt{old} logical value, indicating whether denominators in conditional expectation calculation should use the previous value of the density estimate.

Value

An object of class \texttt{IC}

Author(s)

W.J. Braun
icllde

Interval-Censored Local Linear Density Estimation

Description

This is the local linear version of ickde.

Usage

icllde(I, h, f, m, n.iterations = 10, x1, xm, right.limit = 10000, kernel="gaussian")

Arguments

I       A matrix with two columns, consisting of left and right endpoints of the interval data
h       A scalar bandwidth
f       An initial estimate of the density at a sequence of grid points (optional)
m       The number of (equally-spaced) grid points at which the density is to be estimated
n.iterations       The maximum number of iterations allowed
x1       The minimum grid point (optional)
xm       The maximum grid point (optional)
right.limit       For right-censored data, the value to be used as an artificial right endpoint for the intervals
kernel       character argument indicated choice of kernel; current choices are "gaussian", "epanechnikov", "biweight"

Value

An object of class IC

References


Examples

tmp <- apply(IChemophiliac, 1, mean)
h <- try(dpiik(tmp), silent=T) # dpiik() will work if KernSmooth is loaded
if (class(h) !="numeric") h <- .9 # this makes the example work
# if KernSmooth is not loaded
estimate <- ickde(IChemophiliac, m=200, h=h)
plot(estimate, type="l")
iclocpoly

Interval-Censored Local Polynomial Regression Estimation

Description

Local polynomial regression estimation for interval-censored data.

Usage

iclocpoly(x, y=NULL, y.IC, degree=0, h, niter=10, kernel="normal", gridsize=401)

Arguments

x  
uncensored explanatory variable vector

y  
uncensored portion of response vector (optional)

y.IC  
two-column matrix of left and right interval endpoints for censored responses

degree  
degree of local polynomial

h  
bandwidth

niter  
number of iterations

kernel  
smoothing kernel to be used; default is "normal"; other choices as in the function locpoly

gridsize  
number of gridpoints; again as in locpoly

Value

A list consisting of the explanatory variable x and the imputed responses y as well as the estimate of sigma. Usually, one would apply locpoly with a similar bandwidth to obtain the final fitted model.

Examples

library(KernSmooth)
data(motor.IC)
estimate <- iclocpoly(x=motor.IC$V1, y.IC = cbind(motor.IC$y.L, motor.IC$y.R), degree=0, h=1)
plot(motor.IC$V1, motor.IC$V2)
lines(locpoly(estimate$x, estimate$y, bandwidth=1, degree=0), col=4)
inmost

**Innermost Intervals for Interval-Censored Data**

**Description**

This function calculates the innermost intervals (Turnbull’s algorithm) for interval-censored data. Right-censored data is not allowed at this point.

**Usage**

inmost(data, eps)

**Arguments**

- **data**: A matrix with two columns, consisting of left and right endpoints of the interval data
- **eps**: A scalar additive value which jitters the data slightly to break ties.

**Value**

A 2 column matrix of the left and right endpoints of the innermost intervals.

**Author(s)**

W.J. Braun

**References**


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likelihoodcv

**Log Cross-Validated Likelihood**

**Description**

Log Cross-Validated Likelihood for interval-censored data. The likelihood is the product of integrals over the innermost intervals. Leave-one-out cross-validation here is accomplished by leaving out each innermost interval and re-computing the integral using the remaining data.

**Usage**

likelihoodcv(p, data, m=101)
Arguments

- \( p \) A scalar specifying the bandwidth used in the kernel density estimate.
- \( \text{data} \) A matrix with two columns, consisting of left and right endpoints of the interval data
- \( m \) numeric quantity which controls the number of grid points used in the density estimate

Value

A scalar value.

Author(s)

W.J. Braun

References


motor.IC

Motorcycle Data with artificial interval-censored responses

Description

The original motorcycle data with exponential random variables added and subtracted to the responses to create interval-censored responses.

Usage

data(motor.IC)

Format

A data frame with 4 variables

- \( \text{V1} \) time, the explanatory vector
- \( \text{V2} \) acceleration, the response
- \( \text{y.L} \) \( y \) - an exponential random variable
- \( \text{y.R} \) \( y \) + an exponential random variable
Index

*Topic **datasets**
   - ICGG, 3
   - ICHemophiliac, 3
   - motor.IC, 8

*Topic **models**
   - bickde, 2
   - ickde, 4
   - ic11lde, 5
   - iclocpoly, 6
   - inmost, 7
   - likelihoodcv, 7

bickde, 2
ICGG, 3
ICHemophiliac, 3
ickde, 4
ic11lde, 5
iclocpoly, 6
inmost, 7
likelihoodcv, 7

motor.IC, 8