Package 'md'

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Type Package

Title Selecting Bandwidth for Kernel Density Estimator with Minimum Distance Method

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Description Selects bandwidth for the kernel density estimator with minimum distance method as proposed by Devroye and Lugosi (1996). The minimum distance method directly selects the optimal kernel density estimator from countably infinite kernel density estimators and indirectly selects the optimal bandwidth. This package selects the optimal bandwidth from finite kernel density estimators.

LazyData TRUE

NeedsCompilation no

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`counter` *Get 0-1 vector which is used for calculating empirical measure*

Description

Get 0-1 vector which is used for calculating empirical measure

Usage

```
counter(e2, box2)
```

Arguments

`e2`	integer
`box2`	matrix which has 0-1 elements related to Scheffe set

Value

0-1 vector

`deltaboxm` *Calculating delta*

Description

Calculating delta

Usage

```
deltaboxm(ij, box, box2, mu_box2, grid)
```

Arguments

`ij`	number order vector
`box`	matrix which has estimated values of all kernel density estimators
`box2`	matrix which has 0-1 elements related to Scheffe set
`mu_box2`	matrix which has values of all empirical measures
`grid`	length of grid in domain

Value

delta value

dmm *Get number order matrix which is used in md*

Description

Get number order matrix which is used in md

Usage

```
dmm(i, prod2)
```

Arguments

i	integer
prod2	integer which is defined in md

Value

matrix related to number order

fhat *Calculating estimated density value on some x with bandwidth h*

Description

Calculating estimated density value on some x with bandwidth h

Usage

```
fhat(x, h, data)
```

Arguments

x	scalar
h	bandwidth
data	data sample

Value

estimated density value

Examples

```
fhat(0,0.2,rnorm(100))
```

fhatboxm *Get estimated values of kernel density estimator on domain*

Description

Get estimated values of kernel density estimator on domain

Usage

```
fhatboxm(ij, data_for_d, h, x)
```

Arguments

ij	number order vector
data_for_d	data sample which is split to be used for kernel density estimator
h	bandwidth
x	scalar

Value

estimated values of kernel density estimator on domain

ker *Kernel function*

Description

Kernel function

Usage

```
ker(x)
```

Arguments

x	scalar

Value

density

md	*md selects bandwidth for kernel density estimator with minimum distance method. Minimum distance method directly selects optimal kernel density estimator in countably infinite kernel density estimators and indirectly selects optimal bandwidth. md selects optimal bandwidth in countably finite kernel density estimators.*

Description

md selects bandwidth for kernel density estimator with minimum distance method. Minimum distance method directly selects optimal kernel density estimator in countably infinite kernel density estimators and indirectly selects optimal bandwidth. md selects optimal bandwidth in countably finite kernel density estimators.

Usage

```
md(data,hnumber,ds)
```

Arguments

data	data sample
hnumber	the number of bandwidth which md can select. 60 is enough. Of course, you can take it more.
ds	rate of data split. Minimum distance method has to split data for constructing kernel density estimators and empirical measures.

Value

bandwidth

Examples

```
# select bandwidth
md(runif(100),20,0.6)

# select bandwidth and plot
data <- rnorm(100)
bandwidth <- md(data,20,0.6)
x <- seq(min(data),max(data),length=100)
plot(x,sapply(x,fhat,bandwidth,data),type="l",ylab="density")
```

nom *Get number order matrix which is used in md*

Description

Get number order matrix which is used in md

Usage

```
nom(i, length)
```

Arguments

i	integer
length	the number of grids in domain

Value

matrix related to number order

scheffe *Calculating Scheffe sets*

Description

Calculating Scheffe sets

Usage

```
scheffe(ij, box)
```

Arguments

ij	number order vector
box	estimated values of all kernel density estimators

Value

0-1 vector

subcounter *Auxiliary function which is used in md*

Description

Auxiliary function which is used in md

Usage

```
subcounter(l, data, x)
```

Arguments

l	integer
data	data sample
x	scalar

Value

integer

xmm *Get number order vector which is used in md*

Description

Get number order vector which is used in md

Usage

```
xmm(j)
```

Arguments

j	integer

Value

vector related to number order

xym *Get number order matrix which is used in md*

Description

Get number order matrix which is used in md

Usage

```
xym(i, length)
```

Arguments

i	integer
length	the number of grids in domain

Value

matrix related to number order

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