Package ‘lsbs’

October 13, 2022

Title Bandwidth Selection for Level Sets and HDR Estimation

Version 0.1

Description Bandwidth selection for kernel density estimators of 2-d level sets and highest density regions. It applies a plug-in strategy to estimate the asymptotic risk function and minimize to get the optimal bandwidth matrix. See Doss and Weng (2018) <arXiv:1806.00731> for more detail.

Depends R (>= 3.4.0)

License GPL-3

Encoding UTF-8

LazyData true

Imports ks, numDeriv, Matrix

URL http://arxiv.org/abs/1806.00731

RoxygenNote 6.1.0

NeedsCompilation no

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R topics documented:

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Calculate the optimal bandwidth matrix for highest density region estimation

**Description**

This function allows you to compute the optimal bandwidth matrix for highest density region estimation by using a plug-in strategy.

**Usage**

```r
hdrbs(X, tau, xrange, yrange, gridwidth, init = NULL, maxit = 200, tol = 1e-06, print_obj = FALSE)
```

**Arguments**

- `X`: a matrix with two columns containing the data from the density function.
- `tau`: a probability value between 0 and 1.
- `xrange`: a vector of length 2, e.g., `c(xmin, xmax)`, indicating the range the grid points to be generated on x-axis.
- `yrange`: a vector of length 2, e.g., `c(ymin, ymax)`, indicating the range the grid points to be generated on y-axis.
- `gridwidth`: width between grid points.
- `init`: starting value of the bandwidth matrix for optimization. If not specified, use direct-plug estimator from `ks` package as starting value.
- `maxit`: maximum number of iterations for optimization.
- `tol`: tolerance value for stopping the optimization algorithm.
- `print_obj`: a flag (boolean type) indicates printing the loss function values during optimization or not.

**Value**

the optimal bandwidth matrix.

**References**


**Examples**

```r
X <- matrix(rnorm(100), ncol=2)
xrange <- c(-2.5, 2.5)
yrange <- c(-2.5, 2.5)
hdrbs(X, 0.1, xrange, yrange, 0.1)
```
lsbs

*Calculate the optimal bandwidth matrix for level set estimation*

**Description**
This function allows you to compute the optimal bandwidth matrix for level set estimation by using a plug-in strategy.

**Usage**
```r
lsbs(X, levelc, xrange, yrange, gridwidth, init = NULL, maxit = 200, tol = 1e-06, print_obj = FALSE)
```

**Arguments**
- `X`: a matrix with two columns containing the data from the density function.
- `levelc`: a positive value indicating the height of the level set.
- `xrange`: a vector of length 2, e.g., `c(xmin, xmax)`, indicating the range the grid points to be generated on x-axis.
- `yrange`: a vector of length 2, e.g., `c(ymin, ymax)`, indicating the range the grid points to be generated on y-axis.
- `gridwidth`: width between grid points.
- `init`: starting value of the bandwidth matrix for optimization. If not specified, use direct-plug estimator from ks package as starting value.
- `maxit`: maximum number of iterations for optimization.
- `tol`: tolerance value for stopping the optimization algorithm.
- `print_obj`: a flag (boolean type) indicates printing the loss function values during optimization or not.

**Value**
the optimal bandwidth matrix.

**References**


**Examples**
```r
X <- matrix(rnorm(100), ncol=2)
xrange <- c(-3,3)
yrange <- c(-3,3)
lsbs(X, 0.1, xrange, yrange, 0.05)
```
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