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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hdrbs	*Calculate the optiaml bandwidth matrix for highest density region estimation*

Description

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

Usage

```
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 of length 2, e.g., c(xmin, xmax), indicating the range the grid points to be generated on x-axis
yrange	a vector of 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 optimizatin or not.

Value

the optimal bandwidth matrix.

References

Doss, C.R. and Weng, G., 2018. *Bandwidth selection for kernel density estimators of multivariate level sets and highest density regions.* arXiv preprint arXiv:1806.00731.

Examples

```
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)
```

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lsbs	*Calculate the optiaml bandwidth matrix for level set estimation*

Description

This function allow you to compute the optiaml bandwidth matrix for level set estimation by using a plug-in strategy.

Usage

```
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 of length 2, e.g., c(xmin, xmax), indicating the range the grid points to be generated on x-axis
yrange	a vector of 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 optimizatin or not.

Value

the optimal bandwidth matrix.

References

Doss, C.R. and Weng, G., 2018. *Bandwidth selection for kernel density estimators of multivariate level sets and highest density regions*. arXiv preprint arXiv:1806.00731.

Examples

```
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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