

Package ‘sobolnp’

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Type Package

Title Nonparametric Sobol Estimator with Bootstrap Bandwidth

Version 0.1.0

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Description Algorithm to estimate the Sobol indices using a non-parametric fit of the regression curve. The bandwidth is estimated using bootstrap to reduce the finite-sample bias. The package is based on the paper Solís, M. (2018) <[doi:10.48550/arXiv.1803.03333](https://doi.org/10.48550/arXiv.1803.03333)>.

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URL <https://github.com/maikol-solis/sobolnp/>

BugReports <https://github.com/maikol-solis/sobolnp/issues>

Imports np, minqa, pbmccapply

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

NeedsCompilation no

Repository CRAN

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plot *Plot method for objects sobolnp*

Description

Plot the Sobol indices based in a non-parametric regression with cross-validation and bootstrap bandwidth

Usage

```
plot(snp, ...)  
  
## S3 method for class 'sobolnp'  
plot(snp, ...)
```

Arguments

snp an object of class `sobolnp`
... further arguments passed to the `plot` function

Value

A formatted table with the results of the `sobolnp` function.

Examples

```
ishigami.fun <- function(X) {  
  A <- 7  
  B <- 0.1  
  sin(X[, 1]) + A * sin(X[, 2])^2 + B * X[, 3]^4 * sin(X[, 1])  
}  
  
X <- matrix(runif(3*100, -pi, pi), ncol = 3)  
Y <- ishigami.fun(X)  
  
estimation <- sobolnp(Y = Y, X = X, nboot = 5)  
  
plot(estimation)
```

print	<i>Print method for objects sobolnp</i>
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Description

Print method for objects sobolnp

Usage

```
print(snp, ...)  
  
## S3 method for class 'sobolnp'  
print(snp, ...)
```

Arguments

snp	an object of class sobolnp
...	further arguments passed to the print function

Value

A formatted table with the results of the [sobolnp](#) function.

Examples

```
ishigami.fun <- function(X) {  
  A <- 7  
  B <- 0.1  
  sin(X[, 1]) + A * sin(X[, 2])^2 + B * X[, 3]^4 * sin(X[, 1])  
}  
  
X <- matrix(runif(3*100, -pi, pi), ncol = 3)  
Y <- ishigami.fun(X)  
  
estimation <- sobolnp(Y = Y, X = X, nboot = 5)  
  
print(estimation)
```

sobo1np

*Nonparametric Sobol Estimator with Bootstrap Bandwidth***Description**

Algorithm to estimate the Sobol indices using a non-parametric fit of the regression curve. The bandwidth is estimated using bootstrap to reduce the finite-sample bias.

Usage

```
sobo1np(Y, X, bandwidth = NULL, bandwidth.compute = TRUE,
        bootstrap = TRUE, nboot = 100, ckerorder = 2, mc.cores = 1)
```

Arguments

Y	Response continuous variable
X	Matrix of independent variables
bandwidth	If <code>bandwidth.compute = TRUE</code> , it sets the starting bandwidth to find the bootstrap bandwidth. If <code>NULL</code> the least-square cross-validation bandwidth is used. If <code>bandwidth.compute = FALSE</code> , it will use the values provided fixed over all the simulation. Defaults to <code>NULL</code> .
<code>bandwidth.compute</code>	Logical value. Indicates if the bandwidth should be estimated or not. Defaults to <code>TRUE</code> .
<code>bootstrap</code>	Logical value. Indicates if the estimation should be with bootstrap or not. Defaults to <code>TRUE</code> .
<code>nboot</code>	Number of bootstrap samples taken for the method. Ignored if ' <code>bootstrap = FALSE</code> '. Defaults to 100.
<code>ckerorder</code>	Numeric value specifying kernel order (should be one of (2, 4, 6, 8)). Defaults to 2.
<code>mc.cores</code>	Number of cores used. Defaults to 1.

Value

A list of class `sobo1np` with the following elements:

S First order Sobol indices estimated with nonparametric regression and a cross-validation bandwidth

bws Bandwidth estimated with cross-validation

Sboot First order Sobol indices estimated with nonparametric regression and a bootstrap bandwidth

bwsboot Bandwidth estimated with bootstrap

References

Solís, Maikol. "Nonparametric estimation of the first order Sobol indices with bootstrap bandwidth." *arXiv preprint arXiv:1803.03333* (2018).

Examples

```
ishigami.fun <- function(X) {  
  A <- 7  
  B <- 0.1  
  sin(X[, 1]) + A * sin(X[, 2])^2 + B * X[, 3]^4 * sin(X[, 1])  
}  
  
X <- matrix(runif(3*100, -pi, pi), ncol = 3)  
Y <- ishigami.fun(X)  
  
estimation <- sobolnp(Y = Y, X = X, nboot = 5)
```

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