

Package ‘FiSh’

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Type Package

Title Fisher-Shannon Method

Version 1.0

Author Fabian Guignard [aut],
Mohamed Laib [aut, cre]

Maintainer Mohamed Laib <laib.med@gmail.com>

Description Proposes non-parametric estimates of the Fisher information measure and the Shannon entropy power. The state-of-the-art studies related to the Fisher-Shannon measures, with new analytical formulas for positive unimodal skewed distributions are presented in Guignard et al. <arXiv:1912.02452>. A 'python' version of this work is available on 'github' and 'PyPi' ('FiShPy').

Imports fda.usc, KernSmooth

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URL <https://FiShInfo.github.io/>

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Note The authors are grateful to Mikhail Kanevski, Federico Amato and Luciano Telesca for many fruitful discussions about the use and the application of Fisher-Shannon method.

NeedsCompilation no

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FiSh-package

FiSh: Fisher-Shannon Method

Description

Proposes non-parametric estimates of the Fisher information measure and the Shannon entropy power. The state-of-the-art studies related to the Fisher-Shannon measures, with new analytical formulas for positive unimodal skewed distributions are presented in Guignard et al. <arXiv:1912.02452>. A 'python' version of this work is available on 'github' and 'PyPi' ('FiShPy').

Details

This R code was developed and used for the following paper:

F. Guignard, M. Laib, F. Amato, M. Kanevski, Advanced analysis of temporal data using Fisher-Shannon information: theoretical development and application in geosciences, [arXiv:1912.02452](https://arxiv.org/abs/1912.02452).

Author(s)

Fabian Guignard <fabian.guignard@bluewin.ch> and

Mohamed Laib <laib.med@gmail.com>

Maintainer: Mohamed Laib <laib.med@gmail.com>

References

S. J. Sheather and M. C. Jones (1991). A reliable data-based bandwidth selection method for kernel density estimation. *Journal of the Royal Statistical Society, Series B*, 53, 683 - 690.

M. P. Wand and M. C. Jones (1995). *Kernel Smoothing*. Chapman and Hall, London.

C. Vignat, J.F Bercher (2003). Analysis of signals in the Fisher-Shannon information plane, *Physics Letters A*, 312, 190, 27 - 33.

F. Guignard, M. Laib, F. Amato, M. Kanevski, Advanced analysis of temporal data using Fisher-Shannon information: theoretical development and application in geosciences, [arXiv:1912.02452](https://arxiv.org/abs/1912.02452).

See Also

Useful links:

- <https://FiShInfo.github.io/>

nsrk	<i>Normal scale rule for kernel density estimation</i>
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Description

Bandwidth selector for non-parametric estimation. Estimates the optimal AMISE bandwidth using the Normal Scale Rule with Gaussian kernel.

Usage

```
nsrk(x, log_trsf=FALSE)
```

Arguments

x	Univariate data.
log_trsf	Logical flag: if TRUE the data are log-transformed (usually used for skewed positive data). By default log_trsf = FALSE.

Value

The bandwidth value.

References

M. P. Wand and M. C. Jones, (1995). Kernel Smoothing. Chapman and Hall, London.

Examples

```
x <- rnorm(1000)
h <- nsrk(x)
```

SEP_FIM	<i>Fisher-Shannon method</i>
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Description

Non-parametric estimates of the Shannon Entropy Power (SEP), the Fisher Information Measure (FIM) and the Fisher-Shannon Complexity (FSC), using kernel density estimators with Gaussian kernel.

Usage

```
SEP_FIM(x, h, log_trsf=FALSE, resol=1000, tol = .Machine$double.eps)
```

Arguments

x	Univariate data.
h	Value of the bandwidth for the density estimate
log_trsf	Logical flag: if TRUE the data are log-transformed (used for skewed data), in this case the data should be positive. By default, log_trsf = FALSE.
resol	Number of equally-spaced points, over which function approximations are computed and integrated.
tol	A tolerance to avoid dividing by zero values.

Value

A table with one row containing:

- SEP Shannon Entropy Power.
- FIM Fisher Information Measure.
- FSC Fisher-Shannon Complexity

References

F. Guignard, M. Laib, F. Amato, M. Kanevski, Advanced analysis of temporal data using Fisher-Shannon information: theoretical development and application in geosciences, [arXiv:1912.02452](https://arxiv.org/abs/1912.02452).

Examples

```
library(KernSmooth)
x <- rnorm(1000)
h <- dpik(x)
SEP_FIM(x, h)
```

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