

Package ‘FiSh’

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Type Package

Title Fisher-Shannon Method

Version 1.1

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Description Proposes non-parametric estimates of the Fisher information measure and the Shannon entropy power. More theoretical and implementation details can be found in Guignard et al. <[doi:10.3389/feart.2020.00255](https://doi.org/10.3389/feart.2020.00255)>. A 'python' version of this work is available on 'github' and 'PyPi' ('FiShPy').

Imports fda.usc, KernSmooth

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Encoding UTF-8

RoxygenNote 7.1.1

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.

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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. More theoretical and implementation details can be found in Guignard et al. <doi:10.3389/feart.2020.00255>. A 'python' version of this work is available on 'github' and 'PyPi' ('FiShPy').

Details

If this R code is used for academic research, please cite the following paper where it was developed:
 F. Guignard, M. Laib, F. Amato, M. Kanevski, Advanced analysis of temporal data using Fisher-Shannon information: theoretical development and application in geosciences, 2020, doi: [10.3389/feart.2020.00255](https://doi.org/10.3389/feart.2020.00255) Frontiers in Earth Science, 8:255.

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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, 2020, doi: [10.3389/feart.2020.00255](https://doi.org/10.3389/feart.2020.00255) Frontiers in Earth Science, 8:255.

nsrk

Normal scale rule for kernel density estimation

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, 2020, doi: [10.3389/feart.2020.00255](https://doi.org/10.3389/feart.2020.00255)Frontiers in Earth Science, 8:255.

Examples

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

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