

Package ‘FRCI’

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Type Package
Title Fuzzy & Randomized Confidence Intervals
Version 0.1.1
Description Contains the methods proposed by Geyer and Meeden (2005) [<doi:10.1214/088342305000000340>](https://doi.org/10.1214/088342305000000340) and Trigo et al. (2025) [<doi:10.47749/T/UNICAMP.2025.1500297>](https://doi.org/10.47749/T/UNICAMP.2025.1500297) to construct fuzzy confidence intervals. Compute and plot the fuzzy membership functions of the methods, and the expected length compared with the infimum.
License GPL-3
Imports DescTools, calculus, ump, zipfR, graphics, stats
Encoding UTF-8
Suggests testthat (>= 3.0.0)
Config/testthat/edition 3
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NeedsCompilation no
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plot.psi

Plot for "psi" type objects.

Description

Plot for "psi" type objects.

Usage

```
## S3 method for class 'psi'
plot(
  x,
  ...,
  gamma = 0.95,
  type = "psi",
  xlim = NULL,
  tlim = NULL,
  yval = NULL,
  ylim = NULL
)
```

Arguments

x	A "psi" type object, list containing the following information. [[1]] the membership function [[2]] the name of the sample distribution [[3]] sample size [[4]] the name of method [[5]] standard deviation (for the case of normal distribution). [[6]] the upper and lower bound function of the support of the membership function.
...	Other objects of the "psi" type.
gamma	the confidence level.
type	The type of the plot, by default is the membership function, and "length" for the expected length plot.
xlim	A vector containing the upper and lower values for the x-axis of the plot.
tlim	A vector containing the upper and lower values for theta.
yval	A vector containing the values of omega to be included in the plot. (for type = "psi" only)
ylim	A vector containing the upper and lower values for the y-axis of the plot. (for type = "length" only)

Value

No return value, called for side effects

Examples

```
x<-psi(distribution = "bernoulli", method = "GM", n = 10)
plot(x)
plot(x, type = "length")

x<-psi(distribution = "bernoulli", method = 0.5, n = 10)
plot(x)
plot(x, type = "length")
```

psi

*Fuzzy & Randomized Confidence Intervals***Description**

Function to create "psi" type objects.

Usage

```
psi(distribution = "bernoulli", method = "GM", n = 1, sigma = 1)
```

Arguments

distribution	name of the distribution of the sample. • "normal" for the normal distribution. • "bernoulli" for the Bernoulli or binomial distribution. • "poisson" for the Poisson distribution.
method	numeric value or name of the method that defines how obtain confidence intervals. • A numeric value utilizes the value as reference. • "GM" utilize the Gayer-Meeden method. • "AC" utilize the Agrest-Coull method (for the binomial distribution only). • "SC" utilizes the score method (for the poisson distribution only).
n	sample size.
sigma	standard deviation (for the case of normal distribution).

Value

A list containing the following information.

```
[[1 ]] the membership function
[[2 ]] distribution
[[3 ]] n
[[4 ]] method
[[5 ]] sigma
[[6 ]] the upper and lower bound function of the support of the membership function.
```

References

FELIX, Carlos Henrique Trigo Nasser, Garcia, Nancy Lopes & Sousa, Alex Rodrigo dos Santos. (2025). Uma Nova Abordagem para Construção de Intervalos de Confiança Aleatorizados (Master's thesis, Universidade Estadual de Campinas, Campinas).

GEYER, C. J.; MEEDEN, G. D. Fuzzy and randomized confidence intervals and p-values. *Statistical Science*, v. 20, n. 4, p. 358–366, 2005. ISSN 08834237. Disponível em: <http://www.jstor.org/stable/20061193>.

Examples

```
x<-psi(distribution = "bernoulli", method = "GM", n = 10)
x[[1]](0.3,2)
x[[2]]
x[[3]]
x[[4]]
x[[5]]
x[[6]](2)
```

```
x<-psi(distribution = "bernoulli", method = 0.5, n = 10)
x[[1]](0.6,8)
x[[2]]
x[[3]]
x[[4]]
x[[5]]
x[[6]](8)
```

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