Package 'saCI'

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Title Stochastic Approximation Confidence Interval for Correlation

Version 0.1.0

Description Implements stochastic approximation method for constructing nonparametric confidence intervals for correlation coefficient, based on Xiong & Xu (2016).

License GPL (>= 3)

Encoding UTF-8

Imports boot, MASS, mvtnorm

Suggests testthat (>= 3.0.0), shiny

RoxygenNote 7.3.3

NeedsCompilation no

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Contents

`boot_corrCI` *Bootstrap BCa Confidence Interval for Correlation*

Description

Computes confidence interval for the correlation of two populations using bootstrap BCa (bias-corrected and accelerated) method.

Usage

```
boot_corrCI(x, y, conf.level = 0.95, R = 999)
```

Arguments

`x`	Numeric vector of first variable (must have same length as y)
`y`	Numeric vector of second variable (must have same length as x)
`conf.level`	Confidence level for the interval (default 0.95)
`R`	Number of bootstrap replicates (default 999)

Details

This function implements the BCa (bias-corrected and accelerated) bootstrap method for constructing confidence intervals for Pearson's correlation coefficient. The BCa method adjusts for both bias and skewness in the bootstrap distribution.

The data is standardized in the same way as corrCI_sa for consistency in comparison studies.

Value

An S3 object of class "corrCI_boot" containing:

`lower`	Lower bound of the confidence interval
`upper`	Upper bound of the confidence interval
`estimate`	Point estimate of correlation coefficient
`conf.level`	The confidence level
`method`	Description of the method

References

Efron, B. (1987). Better Bootstrap Confidence Intervals. Journal of the American Statistical Association, 82(398), 171-185.

Examples

```
set.seed(42)
x <- rnorm(30)
y <- x + rnorm(30, sd = 0.5)
result <- boot_corrCI(x, y)
print(result)
```

`corrCI_sa` *Stochastic Approximation Confidence Interval for Correlation*

Description

Computes confidence interval for the correlation of two populations using stochastic approximation via resampling method (Garthwaite, 1996).

Usage

```
corrCI_sa(x, y, conf.level = 0.95)
```

Arguments

`x`	Numeric vector of first variable (must have same length as y)
`y`	Numeric vector of second variable (must have same length as x)
`conf.level`	Confidence level for the interval (default 0.95)

Details

This function implements the stochastic approximation algorithm for constructing nonparametric confidence intervals for Pearson's correlation coefficient, based on Garthwaite (1996). The algorithm uses recursive resampling to find the quantiles of the sampling distribution.

Value

An S3 object of class "corrCI_sa" containing:

`lower`	Lower bound of the confidence interval
`upper`	Upper bound of the confidence interval
`estimate`	Point estimate of correlation coefficient
`conf.level`	The confidence level
`method`	Description of the method
`iterations`	List with components L (iterations for lower bound) and U (iterations for upper bound)

References

Garthwaite, P. H. (1996). Confidence interval formation via stochastic approximation. Statistics and Computing, 6(3), 235-241.

Examples

```
set.seed(42)
x <- rnorm(30)
y <- x + rnorm(30, sd = 0.5)
result <- corrCI_sa(x, y)
print(result)
```

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print.corrCI_boot *Print Method for corrCI_boot Objects*

Description

Prints the results of a bootstrap correlation confidence interval analysis.

Usage

```
## S3 method for class 'corrCI_boot'
print(x, ...)
```

Arguments

x	An object of class "corrCI_boot"
...	Additional arguments passed to print

Value

Prints the confidence interval, estimate, and method information.

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print.corrCI_sa *Print Method for corrCI_sa Objects*

Description

Prints the results of a correlation confidence interval analysis.

Usage

```
## S3 method for class 'corrCI_sa'
print(x, ...)
```

Arguments

x	An object of class "corrCI_sa"
...	Additional arguments passed to print

Value

Prints the confidence interval, estimate, and method information.

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runShinyApp *Run the saCI Shiny Application*

Description

Run the saCI Shiny Application

Usage

```
runShinyApp()
```

Value

Starts the Shiny app

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