Package 'Cronbach'

July 21, 2025

Type Package

Title Cronbach's Alpha

Version 0.3

Date 2025-07-21

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Depends R (>= 3.6.0)

Imports boot, Rfast, Rfast2, stats

Description Cronbach's alpha and various formulas for confidence intervals. The relevant paper is Tsagris M., Frangos C.C. and Frangos C.C. (2013). ``Confidence intervals for Cronbach's reliability coefficient". Recent Techniques in Educational Science, 14-16 May, Athens, Greece.

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

Date/Publication 2025-07-21 12:10:09 UTC

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Cronbach-package *Cronbach's Alpha*

Description

Cronbach's alpha and various formulas for confidence intervals.

Details

Package:	fsn
Type:	Package
Version:	0.3
Date:	2025-07-21
License:	GPL-2

Maintainers

Michail Tsagris <mtsagris@uoc.gr>

Note

Acknowledgments:

Michai Tsagris would like to express his gratitude to Linus Banse for spotting a bug in the function cronfree.ci() when type is "whalen" which has now been fixed.

Author(s)

Michail Tsagris <mtsagris@uoc.gr>, Constantinos Frangos <kfragkos@outlook.com> and Christos Frangos <cfragos@teiath.gr>.

References

Cronbach L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3): 297–334.

Tsagris M., Frangos C.C. and Frangos C.C. (2013). Confidence intervals for Cronbach's reliability coefficient. Recent Techniques in Educational Science, 14-16 May, Athens, Greece. http://www.academia.edu/download/326

`Confidence intervals for Cronbach's alpha`
Confidence intervals for Cronbach's alpha

Description

Confidence intervals for Cronbach's alpha.

Usage

```
cron.ci(x, conf = 0.95, type = "logit", B = 1000)
```

Arguments

`x`	A numerical matrix with the data.
`conf`	The confidence level of the interval
`type`	The type of the confidence interval, "logit", "zyl", "boot", "bca.boot", or "cheap.boot. See details for more information.
`B`	This relevant only for the bootstrap based confidence interval. It is the number of bootstrap samples to generate.

Details

This function contains some confidence intervals for Cronbach's alpha as described in Tsagris, Frangos and Frangos (2013). In particular, the type "zyl" refers to estimating the variance of alpha as suggested by van Zyl J., Neudecker H. and Nel D. (2000) and then constructing the classical confidence interval. The type "logit" computes the logit transformation and then approximates the variance based on the Delta method. This makes use of the variance as computed by van Zyl J., Neudecker H. and Nel D. (2000). The type "boot" computes the classical percentile type of bootstrap, whereas the "bca.boot" computes BCa confidence intervals. Finally, the "cheap.boot" option computes the cheap bootstrap confidence intervals proposed by Lam (2022). In this case, the B needs not be more than 100, even 50 should be enough.

Value

A confidence interval for the true value of alpha.

Author(s)

Michail Tsagris, Christos Frangos and Constantinos Frangos.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>, Christos Frangos <cfragos@teiath.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Tsagris M., Frangos C.C. and Frangos C.C. (2013). Confidence intervals for Cronbach's reliability coefficient. Recent Techniques in Educational Science, 14-16 May, Athens, Greece. http://www.academia.edu/download/326

van Zyl J., Neudecker H. and Nel D. (2000). On the distribution of the maximum likelihood estimator of Cronbach's alpha. Psychometrika, 65(3): 271–280

Efron B. and Tibshirani, R.J. (1993). An introduction to the bootstrap. Chapman & Hall CRC.

Cronbach L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3): 297–334.

Lam H. (2022). A cheap bootstrap method for fast inference. arXiv preprint.

See Also

cronfree.ci, cronbach

Examples

```
## silly example
x <- as.matrix( iris[1:50, 1:4] )
Cronbach::cron.ci(x)
```

`Confidence intervals for Cronbach's alpha without the data`

Confidence intervals for Cronbach's alpha without the data

Description

Confidence intervals for Cronbach's alpha without the data.

Usage

```
cronfree.ci(a, p, n, conf = 0.95, type = "kf")
```

Arguments

a	The Cronbach's alpha.
p	The number of items or variables.
n	The sample size of the data.
conf	The confidence level of the interval
type	The type of confidence interval to compute, "kf" or "whalen". See details for more information.

Details

This function contains some confidence intervals for Cronbach's alpha. The "kf" was described in Tsagris, Frangos and Frangos (2013) and stands for the method of Koning A. and Franses H. P. (2006). The "whalen" stands for the method of Rodriguez and Maeda (2006). The difference with the confidence intervals produced by cron.ci is that with these methods the data are not necessary.

Value

A confidence interval for the true value of alpha.

Author(s)

Michail Tsagris, Christos Frangos and Constantinos Frangos.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>, Christos Frangos <cfragos@teiath.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Tsagris M., Frangos C.C. and Frangos C.C. (2013). Confidence intervals for Cronbach's reliability coefficient. Recent Techniques in Educational Science, 14-16 May, Athens, Greece. http://www.academia.edu/download/326

Rodriguez M. C. and Maeda Y. (2006). Meta-analysis of coefficient alpha. Psychological methods, 11(3): 306–322.

Koning A. and Franses H. P. (2006). Confidence intervals for Cronbach's coefficient alpha values. Technical report, Erasmus Research Institute of Management-ERIM.

Cronbach L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3): 297–334.

See Also

cron.ci, cronbach

Examples

```
## silly example
x <- as.matrix( iris[1:50, 1:4] )
a <- Cronbach::cronbach(x)
Cronbach::cronfree.ci(a, 4, 150)
```

Cronbach's alpha *Cronbach's alpha*

Description

Cronbach's alpha.

Usage

```
cronbach(x)
```

Arguments

x	A numerical matrix with the data.

Details

This function computes Cronbach's alpha internal reliability coefficient.

Value

The Cronbach's alpha.

Author(s)

Michail Tsagris.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>.

References

Cronbach L. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3): 297–334.

See Also

cron.ci, cronfree.ci

Examples

```
## silly example
x <- as.matrix( iris[1:50, 1:4] )
Cronbach::cronbach(x)
```

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