

Package ‘coefficientalpha’

April 22, 2020

Type Package

Title Robust Coefficient Alpha and Omega with Missing and Non-Normal Data

Version 0.7

Date 2020-04-21

Depends rsem, lavaan

Author Zhiyong Zhang and Ke-Hai Yuan

Maintainer Zhiyong Zhang <johnnyzhz@gmail.com>

Description Cronbach's alpha and McDonald's omega are widely used reliability or internal consistency measures in social, behavioral and education sciences. Alpha is reported in nearly every study that involves measuring a construct through multiple test items. The package 'coefficientalpha' calculates coefficient alpha and coefficient omega with missing data and non-normal data. Robust standard errors and confidence intervals are also provided. A test is also available to test the tau-equivalent and homogeneous assumptions. Since Version 0.5, the bootstrap confidence intervals were added.

License GPL

LazyLoad yes

NeedsCompilation no

Repository CRAN

Date/Publication 2020-04-22 04:50:02 UTC

R topics documented:

coefficientalpha-package	2
alpha	2
bootstrap	3
example	4
plot.alpha	5
summary.alpha	6
tau.test	7

Index	8
--------------	----------

coefficientalpha-package

Robust Cronbach's alpha and McDonald's omega with missing and non-normal data

Description

An R package to calculate coefficient alpha and omega with missing data and non-normal data. Robust standard errors and confidence intervals are also provided.

Details

Package: coefficientalpha
Type: Package
Version: 0.3
Date: 2013-01-22
License: GPL

Author(s)

Zhiyong Zhang and Ke-Hai Yuan Maintainer: Zhiyong Zhang <zzhang4@nd.edu>

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

alpha

Robust Cronbach's alpha and McDonald's omega

Description

Calculate alpha or omega for a given data set.

Usage

```
alpha(y, varphi = 0.1, se = FALSE, test = TRUE,  
complete =FALSE, auxiliary = NULL, drop, silent = TRUE)  
omega(y, varphi = 0.1, se = FALSE, test = TRUE,  
complete =FALSE, auxiliary = NULL, drop, silent = TRUE)
```

Arguments

y	Data
varphi	Downweight rate
se	Whether to estimate standard error. It might take significant more time if se is requested with many items.
test	Whether to test the assumption of alpha (tau equivalent test) or omega (homogeneous test).
complete	Calculate alpha/omega only based on complete data (listwise deletion)
auxiliary	Provide a matrix or data frame of auxiliary variables for missing data analysis.
drop	The row number of cases to be dropped from the analysis.
silent	Whether to print information of the analysis.

Author(s)

Zhiyong Zhang and Ke-Hai Yuan

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

Examples

```
data(example)

alpha(example, varphi=.01)
omega(example, varphi=.01)
```

bootstrap

Bootstrap se and CI for alpha and omega

Description

Bootstrap se and CI for alpha and omega.

Usage

```
bootstrap(y, type="omega", alpha=.95, nboot=1000, ci="bc", plot=FALSE,
varphi=0, complete=FALSE, auxiliary=NULL, silent=FALSE)
```

Arguments

y	Data
type	omega: coefficient omega. Otherwise, coefficient alpha.
alpha	Confidence level.
nboot	Number of bootstrap samples to use
ci	bc: Bias-corrected CI. Otherwise, the percentile CI is used.
plot	Whether to plot the bootstrap density.
varphi	Downweight rate
complete	Calculate alpha/omega only based on complete data (listwise deletion)
auxiliary	Provide a matrix or data frame of auxiliary variables for missing data analysis.
silent	Whether to print information of the analysis.

Author(s)

Zhiyong Zhang and Ke-Hai Yuan

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

Examples

```
data(example)

boot.test<-bootstrap(example, type='alpha', nboot=10, plot=TRUE)
```

example

An example data set

Description

An example data set with 10 variables.

Usage

```
data(example)
```

plot.alpha

*Alpha/Omega related plot***Description**

Generate plot related to alpha or omega. Three plot can be generated. (1) The weight plot will plot the weight associated with alpha calculation. (2) Profile plot will plot the cases with smallest weights and the average value. (3) The diagnostic plot plots the alpha according to different values of the tuning parameter.

Usage

```
## S3 method for class 'alpha'
plot(x, type="weight", profile=5, interval=0.01,
center=TRUE, scale=FALSE, w1=FALSE, numbered=FALSE, pos="topright",...)
## S3 method for class 'omega'
plot(x, type="weight", profile=5, interval=0.01,
center=TRUE, scale=FALSE, w1=FALSE, numbered=FALSE, pos="topright",...)
```

Arguments

x	Results from the function alpha or omega .
type	Three types of plots can be generated. type="weight" generates the plot of weight of each case. type="profile" generates a profile plot for the smallest weight. type="weight" generates the diagnostic plot for varphi with an interval of .01.
profile	Number of cases used on the profile plot. At most 10.
interval	The interval used in the diagnostic plot. The default is 0.01.
center	Whether to center the data in the profile plot.
scale	Whether to scale the data using variance parameters in the profile plot.
w1	Whether to plot the weight for means
numbered	Whether to number the profile plot
pos	Position of legend. If pos=NULL, no legend is plotted.
...	Options can be passed to the plot function.

Author(s)

Zhiyong Zhang and Ke-Hai Yuan

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

Examples

```

data(example)

res<-alpha(example, varphi=.01)
## diagnostic plot
plot(res, type='d')

## alpha with varphi=.01 & standard error
res<-alpha(example, varphi=.01, se=TRUE)
## confidence interval
summary(res)

## weight plot
plot(res)
# or
plot(res, type='w')

## profile plot
plot(res, type='p')

```

summary.alpha

Print alpha/omega and its confidence interval.

Description

Print alpha/omega and its confidence interval.

Usage

```

## S3 method for class 'alpha'
summary(object, type = "raw", prob = 0.95,...)
## S3 method for class 'omega'
summary(object, type = "raw", prob = 0.95,...)

```

Arguments

object	Results from the function alpha or omega .
type	If not raw, the CI based on transformation will be provided. The transformed CI will be always in the range of [0,1].
prob	Alpha level for confidence interval. By default, the 95
...	Option can be passed to the summary function.

Author(s)

Zhiyong Zhang and Ke-Hai Yuan

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

Examples

```
data(example)

res<-alpha(example, varphi=.01)
## diagnostic plot
plot(res, type='d')

## alpha with varphi=.01 & standard error
res<-alpha(example, varphi=.01, se=TRUE)
## confidence interval
summary(res)
```

tau.test	<i>Test the tau-equivalence and the homogeneity of items</i>
----------	--

Description

Calculate alpha or omega for a given data set.

Usage

```
tau.test(y, varphi = 0.1, complete = FALSE, drop)
```

Arguments

y	Data
varphi	Downweight rate
complete	Calculate alpha/omega only based on complete data (listwise deletion)
drop	The row number of cases to be dropped from the analysis.

Author(s)

Zhiyong Zhang and Ke-Hai Yuan

References

Zhang, Z. & Yuan, K.-H. (2014). Robust Coefficients Alpha and Omega and their Confidence Intervals: Methods and Software.

Examples

```
data(example)
tau.test(example)
```

Index

- *Topic **Cronbach**
 - coefficientalpha-package, 2
- *Topic **alpha**
 - coefficientalpha-package, 2
- *Topic **robust**
 - coefficientalpha-package, 2
- alpha, 2, 5, 6
- bootstrap, 3
- coefficientalpha
 - (coefficientalpha-package), 2
 - coefficientalpha-package, 2
- example, 4
- omega, 5, 6
- omega(alpha), 2
- plot, 5
- plot(plot.alpha), 5
- plot.alpha, 5
- summary(summary.alpha), 6
- summary.alpha, 6
- tau.test, 7