

# Package ‘coefficientalpha’

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**Type** Package

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

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**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

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coefficientalpha-package

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

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### 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.

### Details

Package: coefficientalpha  
 Type: Package  
 License: GPL

### Author(s)

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### References

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

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alpha

*Robust Cronbach's alpha and McDonald's omega*

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### 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 <a href="#">alpha</a> or <a href="#">omega</a> .                                                                                                                                                                       |
| 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 <a href="#">plot</a> 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 <a href="#">alpha</a> or <a href="#">omega</a> .                                            |
| 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> |
|----------|--------------------------------------------------------------|

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## 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)
```

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