

# Package ‘ClusterBootstrap’

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**Title** Analyze Clustered Data with (Generalized) Linear Models using the Cluster Bootstrap

**Version** 0.9.1

**Description** The ClusterBootstrap package provides functionality for the analysis of clustered data, using the cluster bootstrap.

**Depends** R (>= 3.0), stats, utils, graphics, parallel

**License** GPL (>= 2)

**LazyData** true

**RoxygenNote** 6.0.1

**Author** Mathijs Deen [aut, cre],  
Mark de Rooij [aut]

**Maintainer** Mathijs Deen <m.l.deen@fsw.leidenuniv.nl>

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clusbootglm	<i>Fit (generalized) linear models with the cluster bootstrap</i>
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## Description

Perform a (generalized) linear model with the cluster bootstrap for analysis of clustered data.

## Usage

```
clusbootglm(model, data, clusterid, family = gaussian, B = 5000,  
  confint.level = 0.95, no_cores = 1)
```

**Arguments**

<code>model</code>	(generalized) linear model to be fitted with the cluster bootstrap.
<code>data</code>	dataframe that contains the data.
<code>clusterid</code>	variable in data that identifies the clusters.
<code>family</code>	currently, only Gaussian is supported.
<code>B</code>	number of bootstrap samples.
<code>confint.level</code>	level of confidence interval.
<code>no_cores</code>	number of CPU cores to be used.

**Details**

Some useful methods for the obtained `clusboot` class object are [summary.clusboot](#), [coef.clusboot](#) and [plot.clusboot](#).

**Value**

`clusbootglm` produces an object of class "`clusboot`", containing the following relevant components:

<code>coefficients</code>	A matrix of <code>B</code> rows, containing the parameter estimates for all bootstrap samples.
<code>lm.coefs</code>	Parameter estimates from a single (generalized) linear model.
<code>boot.coefs</code>	Mean values of the parameter estimates, derived from the bootstrap coefficients.
<code>boot.sds</code>	Standard deviations of cluster bootstrap parameter estimates.
<code>ci.level</code>	User defined confidence interval level.
<code>percentile.interval</code>	Confidence interval based on percentiles, given the user defined confidence interval level.
<code>parametric.interval</code>	Confidence interval based on <code>lm.coefs</code> and column standard deviations of coefficients, given the user defined confidence interval level.
<code>BCa.interval</code>	Confidence interval based on percentiles with bias correction and acceleration, given the user defined confidence interval level.

**Author(s)**

Mathijs Deen, Mark de Rooij

**Examples**

```
## Not run:
data(opposites)
clusbootglm(SCORE~Time*COG,data=opposites,clusterid=opposites$Subject)
## End(Not run)
```

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coef.clusboot	<i>Obtain coefficients from cluster bootstrap object</i>
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### Description

Obtain coefficients from cluster bootstrap object

### Usage

```
## S3 method for class 'clusboot'
coef(object, type = "bootstrap", ...)
```

### Arguments

object	cluster bootstrap model.
type	type of coefficient (bootstrap of OLS).
...	other arguments.

### Author(s)

Mathijs Deen

### Examples

```
## Not run:
data(opposites)
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=opposites$Subject)
coef(cbglm.1, type="bootstrap")
## End(Not run)
```

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opposites	<i>Opposites naming data</i>
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### Description

The opposites dataframe consists of 144 observations within 36 individuals that completed an inventory that assesses their performance on a timed cognitive task called "opposites naming".

The dataset does not contain the empirical data within 35 individuals from the experiment by Willett (1988), but a simulation based on the multilevel model from Singer & Willett (2003) within 36 individuals.

### Usage

opposites

## Format

the following variables are available:

- Subject: subject indicator
- Time: a time variable ranging 0-3
- COG: cognitive skill, measured once (at time=0)
- SCORE: score on opposites naming task

## References

- Willett, J.B. (1988). Questions and answers in the measurement of change. In: E. Rothkopf (Ed.), *Review of research in education (1988-89)* (pp. 345-422). Washington, DC: American Educational Research Association.
- Singer, J.D., & Willett (2003). *Applied longitudinal data analysis. Modeling change and event occurrence*. NY: Oxford University Press, Inc.

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plot.clusboot

*Plot confidence intervals of cluster bootstrap*

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## Description

Plot confidence intervals of cluster bootstrap

## Usage

```
## S3 method for class 'clusboot'
plot(x, interval.type = "percentile",
     show.intercept = FALSE, ...)
```

## Arguments

x	object of class clusboot.
interval.type	which confidence interval should be used. Choose par for parametric, per for percentile, or BCa for BCa interval.
show.intercept	plot estimate and confidence interval of the intercept.
...	other arguments.

## Author(s)

Mathijs Deen

## Examples

```
## Not run:
data(opposites)
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=opposites$Subject)
plot(cbglm.1,interval.type="BCa")
## End(Not run)
```

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summary.clusboot	<i>Summarize cluster bootstrap output</i>
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**Description**

Summarize cluster bootstrap output

**Usage**

```
## S3 method for class 'clusboot'  
summary(object, interval.type = "BCa", ...)
```

**Arguments**

object	cluster bootstrap object.
interval.type	which confidence interval should be used. Options are parametric, percentile and BCa intervals.
...	other arguments.

**Author(s)**

Mathijs Deen

**Examples**

```
## Not run:  
data(opposites)  
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=opposites$Subject)  
summary(cbglm.1, interval.type="percentile")  
## End(Not run)
```

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