

Package ‘ClusterBootstrap’

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

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Version 0.9.2

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

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

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URL <https://github.com/mathijsdeen/ClusterBootstrap>

BugReport <https://github.com/mathijsdeen/ClusterBootstrap/issues>

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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

Fit 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>	error distribution to be used in the model, e.g. gaussian or binomial.
<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 `clusbootglm` class object are [summary.clusbootglm](#), [coef.clusbootglm](#), [plot.clusbootglm](#), [clusbootmatrix](#) and [clusbootsample](#).

Value

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

<code>coefficients</code>	A matrix of B rows, containing the parameter estimates for all bootstrap samples.
<code>bootstrap.matrix</code>	n*B matrix, of which each column represents a bootstrap sample; each value in a column represents a unit of <code>subjectid</code> .
<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.
<code>samples.with.NA.coef</code>	Cluster bootstrap sample numbers with at least one coefficient being NA.
<code>failed.bootstrap.samples</code>	For each of the coefficients, the number of failed bootstrap samples are given.

Author(s)

Mathijs Deen, Mark de Rooij

Examples

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

clusbootsample	<i>Return data for specified bootstrap sample</i>
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Description

Returns the full data frame for a specified bootstrap sample in a clusbootglm object.

Usage

```
clusbootsample(object, samplenr)
```

Arguments

object	object of class clusbootglm, created with the clusbootglm function.
samplenr	sample number for which the data frame should be returned.

Author(s)

Mark de Rooij, Mathijs Deen

Examples

```
## Not run:
data(opposites)
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=Subject)
clusbootsample(cbglm.1, samplenr=1)
## End(Not run)
```

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

Returns the coefficients of an object of class clusbootglm.

Usage

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

Arguments

object	object of class clusbootglm.
type	type of coefficient (bootstrap or GLM).
...	other arguments.

Author(s)

Mathijs Deen

Examples

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

confint.clusbootglm	<i>Confidence intervals for cluster bootstrap model parameters</i>
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Description

Computes confidence intervals for one or more parameters in a fitted GLM with the cluster bootstrap.

Usage

```
## S3 method for class 'clusbootglm'
confint(object, parm = "all", level = 0.95,
        type = "percentile", ...)
```

Arguments

object	object of class clusbootglm.
parm	a specification of which parameters are to be given confidence intervals, either a vector of numbers or a vector of names. Defaults to all parameters.
level	the required confidence level
type	type of confidence level. Options are percentile, parametric and BCa.
...	other arguments.

Author(s)

Mathijs Deen

Examples

```
## Not run:
data(opposites)
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=Subject)
confint(cbglm.1,parm=c("Time","COG"), level=.90, type="BCa")
## End(Not run)
```

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, J.B. (2003). *Applied longitudinal data analysis. Modeling change and event occurrence*. NY: Oxford University Press, Inc.

summary.clusbootglm	<i>Summarize output of cluster bootstrap GLM</i>
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Description

Returns the summary of an object of class clusbootglm.

Usage

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

Arguments

object	object of class clusbootglm.
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=Subject)  
summary(cbglm.1, interval.type="percentile")  
## End(Not run)
```

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