Package 'ClusterBootstrap'

June 12, 2017

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

Date 2017-06-12

Version 0.9.3

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-3

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

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

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` *Fit generalized linear models with the cluster bootstrap*

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

model	generalized linear model to be fitted with the cluster bootstrap.
data	dataframe that contains the data.
clusterid	variable in data that identifies the clusters.
family	error distribution to be used in the model, e.g. gaussian or binomial.
B	number of bootstrap samples.
confint.level	level of confidence interval.
no_cores	number of CPU cores to be used.

Details

Some useful methods for the obtained clusbootglm class object are summary.clusbootglm, coef.clusbootglm, and clusbootsample.

Value

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

coefficients	A matrix of B rows, containing the parameter estimates for all bootstrap samples.
bootstrap.matrix	n*B matrix, of which each column represents a bootstrap sample; each value in a column represents a unit of subjectid.
lm.coefs	Parameter estimates from a single (generalized) linear model.
boot.coefs	Mean values of the paramater estimates, derived from the bootstrap coefficients.
boot.sds	Standard deviations of cluster bootstrap parameter estimates.
ci.level	User defined confidence interval level.
percentile.interval	Confidence interval based on percentiles, given the user defined confidence interval level.
parametric.interval	Confidence interval based on lm.coefs and column standard deviations of coefficients, given the user defined confidence interval level.
BCa.interval	Confidence interval based on percentiles with bias correction and acceleration, given the user defined confidence interval level.
samples.with.NA.coef	Cluster bootstrap sample numbers with at least one coefficient being NA.
failed.bootstrap.samples	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 *Return data for specified bootstrap sample*

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 *Obtain coefficients from cluster bootstrap object*

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` *Confidence intervals for cluster bootstrap model parameters*

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 *Opposites naming data*

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 occurence.* NY: Oxford University Press, Inc.

summary.clusbootglm *Summarize output of cluster bootstrap GLM*

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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