Package 'ClusterBootstrap'

April 15, 2017

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

Date 2017-04-15

Version 0.9.1.1-2

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

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

License GPL-3 | file LICENSE

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>

R topics documented:

clusbootglm *Fit (generalized) linear models with the cluster bootstrap*

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

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	currently, only Gaussian is supported.
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 clusboot class object are summary.clusboot, coef.clusboot and plot.clusboot.

Value

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

coefficients	A matrix of B rows, containing the parameter estimates for all bootstrap samples.
bootstrap.matrix	Returns the 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.
failed.bootstrap.samples	When there are bootstrap samples that returned errors (e.g., convergence errors), their sample numbers are listed here.

Author(s)

Mathijs Deen, Mark de Rooij

Examples

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

`clusbootmatrix` *Extract matrix with bootstrap samples*

Description

Obtain a matrix containing the `clusterid` values for the bootstrap samples in a `clusboot` object.

Usage

```
clusbootmatrix(object, whichsample = "all")
```

Arguments

`object`	object of class `clusboot`, created with the `clusbootglm` function.
`whichsample`	"all" for the complete bootstrap matrix, "failed" for bootstrap samples that returned NAs, or a vector of values for specific bootstrap samples.

Author(s)

Mathijs Deen

Examples

```
## Not run:
data(opposites)
cbglm.1 <- clusbootglm(SCORE~Time*COG,data=opposites,clusterid=opposites$Subject)
clusbootmatrix(cbglm.1, whichsample=c(1:5))
## End(Not run)
```

clusbootsample *Create data for specified bootstrap sample*

Description

Returns the full data frame for a specified bootstrap sample

Usage

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

Arguments

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

Author(s)

Mathijs Deen, Mark de Rooij

Examples

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

coef.clusboot *Obtain coefficients from cluster bootstrap object*

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 GLM).
...	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)
```

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

plot.clusboot *Plot confidence intervals of cluster bootstrap*

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)
```

summary.clusboot *Summarize cluster bootstrap output*

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)
```

Index