

Package ‘cglm’

December 6, 2019

Type Package

Title Fits Conditional Generalized Linear Models

Version 1.1

Date 2019-12-06

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Description Estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models for clustered data.

License GPL (>= 2)

Imports Rcpp (>= 0.12.18), stats, nleqslv, data.table

LinkingTo Rcpp, RcppArmadillo

NeedsCompilation yes

Repository CRAN

Date/Publication 2019-12-06 13:50:02 UTC

R topics documented:

cglm	2
print.summary.cglm	4
summary.cglm	4
teenpov	5
Index	6

cglm	<i>Estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models for clustered data.</i>
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Description

cglm estimates the ratio of the regression coefficients and the dispersion parameter in conditional generalized linear models. This is of particular interest in the so-called case-time-control design.

Usage

```
cglm(method, formula, data, id, link, ...)
```

Arguments

method	a string specifying the desired estimation method; either "ts" for two-step estimation, or "cml" for conditional maximum likelihood estimation.
formula	a symbolic description of the model to be fitted.
data	a data frame containing the variables in the model.
id	a string containing the name of the cluster identification variable.
link	a string specifying the desired link function. This argument is not used when method="cml".
...	optional arguments passed on to the nleqslv function or the optim function, which are used to solve the estimating equations when method="ts" and method="cml", respectively. See the help pages for nleqslv and optim.

Details

Let y_{ij} and x_{ij} be the outcome and covariate(s) for subject j in cluster i , respectively. Consider the conditional generalized linear model

$$p(y_{ij}|i, x_{ij}) = \exp \left[\frac{\theta_{ij}y_{ij} - A(\theta_{ij})}{\phi} + k(y_{ij}, \phi) \right]$$

where

$$\theta_{ij} = \eta\{E(y_{ij}|x_{ij})\} = b_i + \beta x_{ij}.$$

cglm estimates the ratio

$$\beta/\phi.$$

This ratio is of particular interest in so-called case-time-control designs; see Sjolander (2016) and Sjolander and Ning (2018) for details. Two estimation methods are allowed; the two-step method proposed by Sjolander (2016) and the conditional maximum likelihood method proposed by Sjolander and Ning (2018).

Value

An object of class "cglm" is a list containing

call	the matched call.
coefficients	the ratio of the estimated coefficients and the estimated dispersion parameter.
var	the variance-covariance matrix.
convergence	was a solution found to the estimating equations?

Note

Missing data are not allowed.

Author(s)

Arvid Sjolander.

References

Sjolander A. (2017). The case-time-control method for non-binary exposures. *Sociological Methodology* **47**(1), 182-211.

Sjolander A., Ning Y. (2018). A general and robust estimation method for the case-time-control design. *Sociological Methodology* **49**(1), 349-365.

Examples

```
data(teenpov)

fit.ide <- cglm(method="ts", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID", link="identity")
summary(fit.ide)

fit.log <- cglm(method="ts", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID", link="log")
summary(fit.log)

fit.cglm <- cglm(method="cml", formula=hours~nonpov+inschool+spouse+age+mother,
  data=teenpov, id="ID")
summary(fit.cglm)
```

```
print.summary.cglm      Prints summary of instrumental variable estimation
```

Description

This is a print method for class "summary.cglm".

Usage

```
## S3 method for class 'summary.cglm'
print(x, digits=max(3L, getOption("digits")-3L),
      signif.stars=getOption("show.signif.stars"), ...)
```

Arguments

x	an object of class "summary.cglm".
digits	the number of significant digits to use.
signif.stars	logical. If TRUE, "significance stars" are printed for each coefficient.
...	not used.

Author(s)

Arvid Sjolander

Examples

```
##See documentation for cglm.
```

```
summary.cglm          Summarizes instrumental variable estimation
```

Description

This is a summary method for class "cglm".

Usage

```
## S3 method for class 'cglm'
summary(object, ...)
```

Arguments

object	an object of class "cglm".
...	not used.

Author(s)

Arvid Sjolander

Examples

##See documentation for cglm.

teenpov*Data from the National Longitudinal Survey of Youth (NLSY).*

Description

This dataset is a subset of a dataset described by Allison (2009). The original data by Allison (2009) comes from the National Longitudinal Survey of Youth (NLSY), and contains information on 1151 teenage girls who were interviewed annually for five years, starting in 1979. The teenpov dataset is constructed by first identifying, for each girl, the first interview at which the girl is not in poverty, then excluding all subsequent interviews for that girl. After this exclusion, the dataset contains 1342 interviews from 401 girls. This procedure is described in greater detail by Sjolander (2017).

Usage

data(teenpov)

Format

The dataset contains the following variables:

ID a unique subject-identifier.

nonpov 1 if the girl is currently not in poverty according to U.S. federal standards.

hours the number of hours that the girl currently works per week.

inschool 1 if the girl is currently enrolled in school, 0 otherwise.

spouse 1 if the girl is currently living with a spouse, 0 otherwise.

age the girl's current age.

mother 1 if the girl currently has at least 1 child, 0 otherwise.

References

Allison P. (2009). Fixed effects regression models: quantitative applications in the Social sciences. Thousand Oaks, CA: Sage.

Sjolander A. (2017). The case-time-control method for non-binary exposures. *Sociological Methodology* **47**(1), 182-211.

Index

`cglm`, [2](#)

`print.summary.cglm`, [4](#)

`summary.cglm`, [4](#)

`teenpov`, [5](#)