Package ‘coxrobust’

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Type Package

Title Fit Robustly Proportional Hazards Regression Model

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Description An implementation of robust estimation in Cox model. Functionality includes fitting efficiently and robustly Cox proportional hazards regression model in its basic form, where explanatory variables are time independent with one event per subject. Method is based on a smooth modification of the partial likelihood.

URL https://github.com/ShanaScogin/coxrobust

BugReports https://github.com/ShanaScogin/coxrobust/issues

License GPL-3

NeedsCompilation yes

Imports survival

Depends R (>= 2.0.0)

Suggests testthat (>= 3.0.0), knitr

Encoding UTF-8

LazyLoad TRUE

RoxygenNote 7.1.2

LinkingTo Rcpp, RcppArmadillo

Config/testthat/edition 3

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coxr  

Fit Robustly Proportional Hazards Regression Model

Description

Fits efficiently and robustly Cox proportional hazards regression model in its basic form, where explanatory variables are time independent with one event per subject. Method is based on a smooth modification of the partial likelihood.

Usage

coxr(
  formula,  
data,  
subset,  
na.action,  
trunc = 0.95,  
f.weight = c("linear", "quadratic", "exponential"),  
singular.ok = TRUE,  
model = FALSE  
)

Arguments

formula  
a formula object, with the response on the left of a \( \sim \) operator, and the terms on the right. The response must be a survival object as returned by the \texttt{Surv} function.

data  
a data frame in which to interpret the variables named in the formula, or in the subset.

subset  
expression saying that only a subset of the rows of the data should be used in the fit.

na.action  
a missing-data filter function, applied to the model.frame, after any subset argument has been used.

trunc  
roughly, quantile of the sample \( T_i \exp(\beta'Z_i) \), it determines the trimming level for the robust estimator.

f.weight  
type of weighting function, default is "quadratic"
singular.ok  logical value indicating how to handle collinearity in the model matrix. If TRUE, the program will automatically skip over columns of the X matrix that are linear combinations of earlier columns. In this case the coefficients for such columns will be NA, and the variance matrix will contain zeros. For ancillary calculations, such as the linear predictor, the missing coefficients are treated as zeros.

model  a logical value indicating whether model frame should be included as a component of the returned value.

Value

a data frame containing MCMC summary statistics. An object of class coxr. See coxr.object for details.

References


Examples

```r
if (interactive()) {
  # Create a simple test data set using the attached function gen_data
  a <- gen_data(200, c(1, 0.1, 2), cont = 0.05, p.censor = 0.30)
  result <- coxr(Surv(time, status) ~ X1 + X2 + X3, data = a, trunc = 0.9)
  result
  plot(result)
}
```

coxr.object  
Fit Robustly Proportional Hazards Regression Object

Description

This class of objects is returned by coxr function to represent efficiently and robustly fitted proportional hazards regression model. Objects of this class have methods for the functions print, plot and predict.
Value

The following components must be included in a legitimate coxr object.

- **coefficients**: robust estimate of the regression parameter.
- **ple.coefficients**: non-robust (efficient) estimate of the regression parameter.
- **var**: an approximate variance matrix of the coefficients (estimated robustly). Rows and columns corresponding to any missing coefficients are set to zero.
- **ple.var**: an approximate variance matrix of the coefficients (estimated non-robustly). Rows and columns corresponding to any missing coefficients are set to zero.
- **lambda**: cumulated hazard (estimated robustly).
- **lambda.ple**: cumulated hazard (estimated non-robustly).
- **wald.test**: the value of Wald test.
- **ewald.test**: the value of extended Wald test.
- **skip**: skipped columns.
- **na.action**: the na.action attribute, if any, that was returned by the na.action routine.

The object also contain the following, for documentation see the `lm` object: `terms`, `call`, `x`, `y` and optionally `model`.

See Also

- coxr

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**coxrobust**

**coxrobust Overview**

Description

This package currently has one main function that fits a robustly proportional hazards regression model.

Main Functions

- `coxr()`
- `gen_data()`
- `plot.coxr()`
- `predict.coxr()`
**gen_data**

*Generate Data from the Proportional Hazards Regression Model*

### Description
Generates data set from the proportional hazards regression model without or with contamination.

### Usage
```r
gen_data(n, beta, cont = 0, p.censor = 0)
```

### Arguments
- **n**: number of observations.
- **beta**: vector of regression coefficients.
- **cont**: fraction of contaminated observations.
- **p.censor**: probability of censoring.

### Value
Data frame containing the following variables:

- **time**: vector of survival times.
- **status**: vector of censoring status.
- **X1, X2, ...**: explanatory variables (their number is determined by the dimension of vector of regression coefficients).

### Examples
```r
if (interactive()) {
  gen_data(50, c(2,-2), cont = 0.05)
}
```
**plot.coxr**

*Plot Diagnostics for a coxr Object*

**Description**

Graphical tool which in a series of 5 graphs let us compare how well data are explained by the estimated proportional hazards model with non-robust (black color) and robust method (green color). The first graph gives standardized difference of two estimated survival functions; one via the Cox model and the other via Kaplan Meier estimator. The following four graphs show the same differences for four strata, defined by the quartiles of the estimated linear predictor. Comparison of estimation results along with analysis of the graphs leads frequently to a very detailed information about the model fit (see examples).

**Usage**

```r
## S3 method for class 'coxr'
plot(
  x,
  caption = c("Full data set", "First quartile", "Second quartile", "Third quartile", "Fourth quartile"),
  main = NULL,
  xlab = "log time",
  ylab = "standardized survival differences",
  ..., 
  color = TRUE
)
```

**Arguments**

- `x` coxr object, typically result of coxr.
- `caption` captions to appear above the plots.
- `main` overall title for the plot.
- `xlab` title for the x axis.
- `ylab` title for the y axis.
- `...` other parameters to be passed through to plotting functions.
- `color` if FALSE grayscale mode is used.

**Value**

Data frame containing the following variables:

- timevector of survival times.
- statusvector of censoring status.
- X1, X2, ...explanatory variables (their number is determined by the dimension of vector of regression coefficients).
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