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

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LazyLoad TRUE

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R topics documented:

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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 ~ operator, and the terms on the right. The response must be a survival object as returned by the `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

Bednarski, T. (1993). Robust estimation in Cox's regression model. Scandinavian Journal of Statistics. Vol. 20, 213–225.

Bednarski, T. (1989). On sensitivity of Cox's estimator. Statistics and Decisions. 7, 215–228.

Grzegorek, K.(1993). On robust estimation of baseline hazard under the Cox model and via Frechet differentiability. Preprint of the Institute of Mathematics of the Polish Academy of Sciences.518.

Minder, C.E. & Bednarski, T. (1996). A robust method for proportional hazards regression. Statistics in Medicine Vol. 15, 1033–1047.

Examples

```
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)
}
```

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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()`

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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

```
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:

- timevector of survival times.

- statusvector of censoring status.

- X1, X2, ...explanatory variables (their number is determined by the dimension of vector of regression coefficients).

Examples

```
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

```
## 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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