Package 'cmprskQR'

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Title Analysis of Competing Risks Using Quantile Regressions

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Depends R (>= 2.13.0)

Imports graphics, quantreg, stats, survival

Description Estimation, testing and regression modeling of
subdistribution functions in competing risks using quantile regressions,
as described in Peng and Fine (2009) <DOI:10.1198/jasa.2009.tm08228>.

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R topics documented:

crrQR 2
plot.crrQR 4
plot.predict.crrQR 4
predict.crrQR 5
summary.crrQR 6

Index **8**

crrQR *Competing Risks Quantile Regression*

Description

quantile regression modeling of subdistribution functions in competing risks

Usage

```
crrQR(ftime, fstatus, X, failcode=1, cencode=0,
tau.range=c(0.01,0.99), tau.step=0.01, subset,
na.action=na.omit, rq.method="br", variance=TRUE)

## S3 method for class 'crrQR'
print(x, ...)
```

Arguments

ftime	vector of failure/censoring times
fstatus	vector with a unique code for each failure type and a separate code for censored observations
X	matrix (nobs x ncovs) of covariates
failcode	code of fstatus that denotes the failure type of interest
cencode	code of fstatus that denotes censored observations
tau.range	vector of length 2 denoting the range of quantiles
tau.step	grid size on tau.range (spacing between two grid points)
subset	a logical vector specifying a subset of cases to include in the analysis
na.action	a function specifying the action to take for any cases missing any of ftime, fstatus, cov1, cov2, cengroup, or subset.
rq.method	method of computation for quantile regressions. (cf. documentation of method rq.fit in package quantreg for details.)
variance	if FALSE, then suppresses computation of asymptotic variances
x	crrQR object (output from crrQR()) for method print
...	included for compatibility with the generic functions. Not currently used.

Details

Fits the competing risks quantile regression model described in Peng and Fine (2009).

While the use of model formulas is not supported, the model.matrix function can be used to generate suitable matrices of covariates from factors, eg model.matrix(~factor1+factor2)[,-1] will generate the variables for the factor coding of the factors factor1 and factor2. The final [,-1] removes the constant term from the output of model.matrix.

If variance=FALSE, then some of the functionality in summary.crrQR and print.crrQR will be lost. This option can be useful in situations where crrQR is called repeatedly for point estimates, but standard errors are not required, such as in bootstrapping the cumulative incidence function for confidence intervals.

The print method prints the estimated coefficients, the estimated standard errors, and the two-sided p-values for the test of the individual coefficients equal to 0.

A first implementation of the estimation procedure was prepared by Limin Peng and Ruosha Li.

Value

Returns a list of class crrQR, with components

$beta.seq	the estimated regression coefficients
$tau.seq	the sequence of quantiles computed
$var.seq	estimated variance covariance matrix of coef
$inf.func	list of estimated influence functions
$call	the call to crr
$n	the number of observations used in fitting the model
$n.missing	the number of observations removed from the input data due to missing values
$cvt.length	number of covariates (columns of X)

References

Peng L and Fine JP (2009) Competing risks quantile regression. JASA 104:1440-1453.

See Also

predict.crrQR plot.predict.crrQR summary.crrQR rq.fit

Examples

```
# simulated data to test
set.seed(10)
ftime <- rexp(200)
fstatus <- sample(0:2,200,replace=TRUE)
X <- matrix(runif(600),nrow=200)
dimnames(X)[[2]] <- c('x1','x2','x3')
#compute model
print(z <- crrQR(ftime,fstatus,X))
summary(z)
# predict and plot cumulative incedences
reference <- as.matrix(rbind(c(.1,.5,.8),c(.1,.5,.2)))
dimnames(reference)[[2]] <- c('x1','x2','x3')
z.p <- predict(z,reference)
print(z.p)
plot(z.p,lty=1,color=2:3)
crrQR(ftime,fstatus,X,failcode=2)
```

plot.crrQR *Plot estimated coefficients*

Description

plot method for crrQR

Usage

```
## S3 method for class 'crrQR'
plot(x, subset=NULL, main=NULL, ...)
```

Arguments

x	output from crrQR
subset	plot a subset of coefficients
main	main title of the plot
...	other arguments to plot

Side Effects

plots the variable profiles for each curve

See Also

crrQR

plot.predict.crrQR *Plot estimated subdistribution functions*

Description

plot method for predict.crrQR

Usage

```
## S3 method for class 'predict.crrQR'
plot(x, lty=1:(ncol(x)-1), color=1,
ylim=c(0, max(x[, -1])), xmin=0, xmax=max(x[, 1]), ...)
```

Arguments

x	output from predict.crrQR
lty	vector of line types. If length is $<$ \# curves, then lty[1] is used for all.
color	vector of line colors. If length is $<$ \# curves, then color[1] is used for all.
ylim	range of y-axis (vector of length two)
xmin	lower limit of x-axis (often 0, the default)
xmax	upper limit of x-axis
...	other arguments to plot

Side Effects

plots the subdistribution functions estimated by predict.crrQR, by default using a different line type for each curve

See Also

crrQR predict.crrQR

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predict.crrQR *Estimate subdistribution functions from crrQR output*

Description

predict method for crrQR

Usage

```
## S3 method for class 'crrQR'
predict(object, x, ...)
```

Arguments

object	output from crrQR
x	vector of covariate values for which the conditional distribution function is to be estimated. The columns of x must be named the same as in the original call to crrQR. Each must be given if present in the original call to crrQR.
...	add rearrangement=TRUE to perform a rearrangement of the predicted probabilities as suggested in Chernozhukov V, Fernández-Val I and Galichon A (2010).

Details

Computes the conditional estimate given values of covariates from $sup(\tau : \tau \leq \zeta_{x,j}^{-1}[\ln(t)])$, for $\zeta_{x,j}(\tau) = x'\beta_j(\tau)$ (see Dlugosz S, Lo S and Wilke RA (2014) for details)

Value

Returns a matrix with the unique type 1 failure times in the first column, and the other columns giving the estimated subdistribution function corresponding to the covariate combinations in the rows of x, at each failure time (the value that the estimate jumps to at that failure time).

References

Chernozhukov V, Fernández-Val I and Galichon A (2010) Quantile and probability curves without crossing. Econometrica 78, 1093-1125.

Dlugosz S, Lo S, Wilke RA (2014) Competing risks quantile regression at work: In-depth exploration of the role of public child support for the duration of maternity leave. unpublished.

See Also

`crrQR` `plot.predict.crrQR`

`summary.crrQR` *Summary method for crrQR*

Description

generate and print summaries of crrQR output

Usage

```
## S3 method for class 'crrQR'
summary(object, conf.int = 0.95, digits =
max(options()$digits - 5, 2), ...)

## S3 method for class 'summary.crrQR'
print(x, digits=max(options()$digits - 4, 3), ...)
```

Arguments

`object`	an object of class crrQR (output from the crrQR function)
`conf.int`	the level for a two-sided confidence interval on the coefficients. Default is 0.95.
`digits`	in `summary.crrQR`, `digits` determines the number of significant digits retained in the p-values. In `print.summary.crrQR`, `digits` sets the values of the `digits` option for printing the output.
`...`	included for compatibility with the generic functions. Not currently used.
`x`	an object of class summary.crrQR (output from the summary method for crrQR)

Details

The summary method calculates the average effects, the variances and p-values of the test on the effect beeing 0. Furthermore it performs a test for constant coefficients. The print method prints a fairly standard format tabular summary of the results.

Value

`summary.crrQR` returns a list of class summary.crrQR, which contains components

`call`	the call to crr
`n`	the number of observations used in fitting the model
`n.missing`	the number of observations removed by `crr` from the input data due to missing values
`ave.eff`	vector of average effects of covariates
`var.ave.eff`	vector of corresponding variances
`p.signf.test`	p-values for testing average effect=0
`cnst.test`	scores of test on constant effect
`var.cnst.test`	variances of the score
`p.cnst.test`	p-values for the test

See Also

`crrQR`

Examples

```
## see examples in the crrQR help file
```

Index

∗Topic **survival**
crrQR, 2
plot.crrQR, 4
plot.predict.crrQR, 4
predict.crrQR, 5
summary.crrQR, 6

crrQR, 2, *4–7*

plot.crrQR, 4
plot.predict.crrQR, *3*, 4, *6*
predict.crrQR, *3*, *5*, 5
print.crrQR *(*crrQR*)*, 2
print.summary.crrQR *(*summary.crrQR*)*, 6

rq.fit, *2, 3*

summary.crrQR, *3*, 6