# Package ‘crrstep’

February 23, 2015

**Type** Package  

**Title** Stepwise Covariate Selection for the Fine & Gray Competing Risks Regression Model  

**Version** 2015-2.1  

**Date** 2015-02.23  

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**Description**  
Performs forward and backwards stepwise regression for the Proportional subdistribution hazards model in competing risks (Fine & Gray 1999). Procedure uses AIC, BIC and BICcr as selection criteria. BICcr has a penalty of $k = \log(n^*)$, where $n^*$ is the number of primary events.

**Depends** cmprsk  

**License** GPL (>= 2)  

**LazyLoad** yes  

**NeedsCompilation** no  

**Repository** CRAN  

**Date/Publication** 2015-02-23 23:17:17

## R topics documented:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>crrstep-package</td>
<td>2</td>
</tr>
<tr>
<td>crrstep</td>
<td>3</td>
</tr>
</tbody>
</table>

**Index** 6
**Description**

Performs forward and backward stepwise regression for the Fine & Gray regression model in competing risks. Procedure uses AIC, BIC and BICcr as selection criteria. BICcr has a penalty of $k = \log(n^*)$, where $n^*$ is the number of Type I events.

**Details**

- **Package**: crrstep
- **Type**: Package
- **Version**: 2014-07.16
- **Date**: 2014-07.16
- **License**: GPL (version 2)
- **LazyLoad**: yes

The package contains a single function `crrstep`, which implements backward and forward stepwise regression for the Fine & Gray regression model. The Fine & Gray model (Fine & Gray, 1999) estimates the hazard that corresponds to the cumulative incidence function of a certain event type. Selection criteria that can be used are: AIC, BIC and BICcr. BICcr is a selection criteria based on the work by Volinksy and Raftery in which the penalty is $k = \log(n^*)$, where $n^*$ is the total number of Type I events.

**Author(s)**

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**References**


**Examples**

```r
set.seed(123)
n <- 500
ftime <- rexp(n)
```
crrstep <- sample(0:2,n,replace=TRUE)
cov1 <- matrix(runif(5*n),nrow=n)
ox1 <- as.factor(sample(3, size=n, rep=TRUE))
ox2 <- as.factor(sample(5, size=n, rep = TRUE))
cov1 <- cbind(cov1, x1, x2)
dimnames(cov1)[[2]] <- c('x1', 'x2', 'x3', 'x4', 'x5', 'x6', 'x7')
formula1 <- ftime ~ 1 + x1 + x2 + x3 + x4 + x5 + as.factor(x6) + as.factor(x7)
crrstep(formula1, fstatus, data = as.data.frame(cov1), direction = "backward", criterion = "BIC")
crrstep(formula1, fstatus, data = as.data.frame(cov1), direction = "backward", criterion = "AIC")
ans2 <- crrstep(formula1, fstatus, data = as.data.frame(cov1), direction = "forward",
failcode=2, criterion = "AIC")
ans2

**crrstep**

*Stepwise regression for competing risks regression*

**Description**

Performs forward and backward stepwise regression for the Fine & Gray regression model in competing risks. Procedure uses AIC, BIC and BICcr as selection criteria. BICcr has a penalty of \( k = \log(n^*) \), where \( n^* \) is the number of Type I events.

**Usage**

```r
crrstep(formula, scope.min = ~1, etype, ..., subset,
data, direction = c("backward", "forward"),
criterion = c("AIC", "BICcr", "BIC"), crr.object = FALSE,
trace = TRUE, steps = 100)
```

**Arguments**

- `formula`: formula object where LHS is failure time and RHS is linear predictors; intercept ‘1’ should always be included.
- `scope.min`: formula object denoting final model for backward selection and starting model for forward selection.
- `etype`: integer variable that denotes type of failure for each person.
- `...`: variables passed to ‘crr’ function; two key variables are `failcode` and `cencode`; see below in Description.
- `subset`: subset of data to be used for model selection.
- `data`: data-frame containing all the variables. Only complete cases are used in the analysis, i.e. rows of dataframe with missing values in any of the predictors are deleted.
- `direction`: forward or backward direction for model selection.
criterion  selection criterion; default is AIC. BIC uses log(n) as penalty, where 'n' is total sample size, and BICcr uses log(n*) as the penalty where n* is the number of primary events.
crr.object  logical variable indicating whether to return final 'crr' object.
trace     logical indicating whether to display stepwise model selection process.
steps     maximum number of steps in stepwise selection.

Details

Based on the existing code of stepAIC in the MASS package. Variables passed to 'crr' function include two key variables: failcode and cencode. failcode is an integer value that denotes primary failure, and cencode is an integer denoting censoring event.

Value

variables  Variables in the final model
coefficients  The estimated coefficients of the variables
std.errors  Standard errors of the estimated coefficients
log.lik  The partial log-likelihood of the model

Author(s)

Ravi Varadhan & Deborah Kuk.

References


See Also

crr

Examples

set.seed(123)
n <- 500
ftime <- rexp(n)
fstatus <- sample(0:2,n,replace=TRUE)
cov1 <- matrix(runif(5*n),nrow=n)
x61 <- as.factor(sample(3, size=n, rep=TRUE))
x71 <- as.factor(sample(5, size=n, rep=TRUE))
cov1 <- cbind(cov1, x61, x71)
dimnames(cov1)[[2]] <- c('x1', 'x2', 'x3', 'x4', 'x5', 'x6', 'x7')
crrstep

```r
formula1 <- ftime ~ x1 + x2 + x3 + x4 + x5 + as.factor(x6) + as.factor(x7)
crrstep(formula1, fstatus, data = as.data.frame(cov1), direction = "backward", criterion = "BIC")

ans2 <- crrstep(formula1, fstatus, data = as.data.frame(cov1), direction = "forward",
                failcode=2, criterion = "AIC")
ans2
```
Index

*Topic competing risks
  crrstep, 3
*Topic stepwise
  crrstep, 3

crr, 4
crrstep, 3
crrstep-package, 2