Package 'splineCox'

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Type Package

Title A Two-Stage Estimation Approach to Cox Regression Using M-Spline
Function

Version 0.0.1

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Description Implements a two-stage estimation approach for Cox
regression using five-parameter M-spline functions to model the baseline hazard. It allows
for flexible hazard shapes and model selection based on log-likelihood criteria.

License GPL (>= 3)

Encoding UTF-8

RoxygenNote 7.3.2

Roxygen list(markdown = TRUE)

Imports joint.Cox

Suggests knitr, rmarkdown, spelling

VignetteBuilder knitr

Language en-US

NeedsCompilation no

R topics documented:

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splineCox.reg1   *Fitting the five-parameter spline Cox model giving a specified shape*

Description

splineCox.reg1 estimates the parameters of a five-parameter spline Cox model based on a specified shape for the baseline hazard function. The function calculates the estimates for the model parameters (beta) and the baseline hazard scale parameter (gamma), using non-linear optimization.

Usage

```
splineCox.reg1(
  t.event,
  event,
  Z,
  xi1 = min(t.event),
  xi3 = max(t.event),
  model = "constant",
  p0 = rep(0, 1 + ncol(as.matrix(Z)))
)
```

Arguments

t.event	a vector for time-to-event
event	a vector for event indicator (=1 event; =0 censoring)
Z	a matrix for covariates; nrow(Z)=sample size, ncol(Z)=the number of covariates
xi1	lower bound for the hazard function; the default is min(t.event)
xi3	upper bound for the hazard function; the default is max(t.event)
model	A character string specifying the shape of the baseline hazard function. Available options include: "increase", "constant", "decrease", "unimodal1", "unimodal2", "unimodal3", "bathtub1", "bathtub2", "bathtub3". Default is "constant"
p0	Initial values to maximize the likelihood (1 + p parameters; baseline hazard scale parameter and p regression coefficients)

Value

A list containing the following components:

model	A character string indicating the shape of the baseline hazard function used.
parameter	A numeric vector of the parameters defining the baseline hazard shape.
beta	A named vector with the estimates, standard errors, and 95% confidence intervals for the regression coefficients
gamma	A named vector with the estimate, standard error, and 95% confidence interval for the baseline hazard parameter
loglik	A named vector containing the log-likelihood (LogLikelihood), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC)

Examples

```
# Example data
library(joint.Cox)
data(dataOvarian)
t.event = dataOvarian$t.event
event = dataOvarian$event
Z = dataOvarian$CXCL12

reg1 <- splineCox.reg1(t.event, event, Z, model = "constant")
print(reg1)
```

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splineCox.reg2   *Fitting the five-parameter spline Cox model with a specified shape, selecting the best fit*

Description

`splineCox.reg2` estimates the parameters of a five-parameter spline Cox model for multiple specified shapes and selects the best fitting model based on the minimization of the log-likelihood function. The function calculates the estimates for the model parameters (beta) and the baseline hazard scale parameter (gamma), using non-linear optimization.

Usage

```
splineCox.reg2(
  t.event,
  event,
  Z,
  xi1 = min(t.event),
  xi3 = max(t.event),
  model = names(shape.list),
  p0 = rep(0, 1 + ncol(as.matrix(Z)))
)
```

Arguments

`t.event`	a vector for time-to-event
`event`	a vector for event indicator (=1 event; =0 censoring)
`Z`	a matrix for covariates; nrow(Z)=sample size, ncol(Z)=the number of covariates
`xi1`	lower bound for the hazard function; the default is min(t.event)
`xi3`	upper bound for the hazard function; the default is max(t.event)
`model`	A character vector specifying which model shapes to consider for the baseline hazard. Available options are: "increase", "constant", "decrease", "unimodal1", "unimodal2", "unimodal3", "bathtub1", "bathtub2", "bathtub3". Default is `names(shape.list)` which includes all available models.
`p0`	Initial values to maximize the likelihood (1 + p parameters; baseline hazard scale parameter and p regression coefficients)

Value

A list containing the following components:

`model`	A character string indicating the shape of the baseline hazard function used.
`parameter`	A numeric vector of the parameters defining the baseline hazard shape.
`beta`	A named vector with the estimates, standard errors, and 95% confidence intervals for the regression coefficients
`gamma`	A named vector with the estimate, standard error, and 95% confidence interval for the baseline hazard parameter

loglik   A named vector containing the log-likelihood (`LogLikelihood`), Akaike Information Criterion (`AIC`), and Bayesian Information Criterion (`BIC`) for the best-fitting model

other_models   A data frame containing the log-likelihood (`LogLikelihood`) for all other evaluated models, with model names as row names.

Examples

```
# Example data
library(joint.Cox)
data(dataOvarian)
t.event = dataOvarian$t.event
event = dataOvarian$event
Z = dataOvarian$CXCL12

M = c("constant", "increase", "decrease")
reg2 <- splineCox.reg2(t.event, event, Z, model = M)
print(reg2)
```

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