Package ‘SimSCRPiecewise’

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Type Package

Title 'Simulates Univariate and Semi-Competing Risks Data Given Covariates and Piecewise Exponential Baseline Hazards'

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Author Andrew G Chapple

Maintainer Andrew G Chapple <Andrew.G.Chapple@rice.edu>

Description Contains two functions for simulating survival data from piecewise exponential hazards with a proportional hazards adjustment for covariates. The first function SimUNIVPiecewise simulates univariate survival data based on a piecewise exponential hazard, covariate matrix and true regression vector. The second function SimSCRPiecewise simulates semi-competing risks data based on three piecewise exponential hazards, three true regression vectors and three matrices of patient covariates (which can be different or the same). This simulates from the Semi-Markov model of Lee et al (2015) given patient covariates, regression parameters, patient frailties and baseline hazard functions.

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LazyData TRUE

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Description

This function simulates semi-competing risks data based on three piecewise exponential hazards, three true regression vectors and three matrices of patient covariates (which can be different or the same). This simulates from the semi-markov model of Lee et al (2015) given patient covariates, regression parameters and baseline hazard functions.

Usage

SimSCRPiecewise(x1, x2, x3, beta1, beta2, beta3, s1, s2, s3, lam1, lam2, lam3, gamma, cens)

Arguments

- **x1**: Matrix of patient covariates for hazard 1 simulation
- **x2**: Matrix of patient covariates for hazard 2 simulation
- **x3**: Matrix of patient covariates for hazard 3 simulation
- **beta1**: vector of size ncol(x1) that is the true regression coefficient vector for hazard 1
- **beta2**: vector of size ncol(x2) that is the true regression coefficient vector for hazard 2
- **beta3**: vector of size ncol(x3) that is the true regression coefficient vector for hazard 3
- **s1**: vector of size at least length 2, where the first entry is 0. This characterizes the split point locations of baseline hazard 1
- **s2**: vector of size at least length 2, where the first entry is 0. This characterizes the split point locations of baseline hazard 2
- **s3**: vector of size at least length 2, where the first entry is 0. This characterizes the split point locations of baseline hazard 3
- **lam1**: vector of the same size as s1. This vector is the true baseline hazard 1 heights and the last entry represents the height on the interval [max(s1), infinity)
- **lam2**: vector of the same size as s2. This vector is the true baseline hazard 2 heights and the last entry represents the height on the interval [max(s2), infinity)
- **lam3**: vector of the same size as s3. This vector is the true baseline hazard 3 heights and the last entry represents the height on the interval [max(s3), infinity)
- **gamma**: vector containing patient frailties.
- **cens**: This is the administrative right censoring time of the study. All patients who have survival outcomes after cens have survival times set to cens.
**SimUNIVPiecewise**

**Value**

Returns a list of size 4 containing the semi-competing risks simulated data. Entry 1 contains the non-terminal event times for the patients. Entry 2 contains the terminal event times for the patients. Entry 3 contains the patient indicators for whether or not a patient experienced a non-terminal event prior to death. Entry 4 contains the patient indicators for whether or not they experienced a terminal event.

**References**


**Examples**

```r
##Set number of patients and covariate matrices
n=100
x1=matrix(rnorm(n*1P,P,1I,nrow=n)
x2=x1
x3=x1
##Sets up true covariate vectors
beta1=rnorm(1P,P,1I
beta2=rnorm(1P,P,1I
beta3=c(3,rep(0,9))
##Sets up three baseline hazard split locations
s1=c(0,7,30,100,1000)
s2=c(0,50,100,2000)
s3=c(0,10,40,50,500)
##Sets up baseline hazard heights
lam1=c(1,1,1,1,1)
lam2=c(1,3,1,1)
lam3=c(1,3,2,2,1)
gamma=rgamma(1P,1,1)
##Runs Function and returns a list of simulated data
X=simUNIVPiecewise(x1,x2,x3,beta1,beta2,beta3,s1,s2,s3,lam1,lam2,lam3,gamma,1000)
X
```

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**SimUNIVPiecewise**

**Description**

This function simulates univariate survival data from a piecewise exponential model with a proportional hazards assumption given a covariate matrix, true beta vector, baseline hazard splits, baseline hazard heights and a right censoring time.

**Usage**

```r
SimUNIVPiecewise(x1, beta1, s1, lam1, cens)
```
SimUNIVPiecewise

Arguments

- **x1** - Matrix of patient covariates for hazard 1 simulation
- **beta1** - vector of size ncol(x1) that is the true regression coefficient vector for the baseline hazard function
- **s1** - vector of size at least length 2, where the first entry is 0. This characterizes the split point locations of baseline hazard
- **lam1** - vector of the same size as s1. This vector is the true baseline hazard heights and the last entry represents the height on the interval [max(s1), infinity)
- **cens** - This is the administrative right censoring time of the study. All patients who have survival outcomes after cens have survival times set to cens.

Value

Returns a list of size 4 containing the semi-competing risks simulated data. Entry 1 contains the non-terminal event times for the patients. Entry 2 contains the terminal event times for the patients. Entry 3 contains the patient indicators for whether or not a patient experienced a non-terminal event prior to death. Entry 4 contains the patient indicators for whether or not they experienced a terminal event.

References


Examples

```r
## Set number of patients and covariate matrices
n=100
x1=matrix(rnorm(n*10,0,1),nrow=n)
## Sets up true covariate vector
beta1=runif(10,0,1)
## Sets up true baseline hazard split locations
s1=c(0,7,30,100,1000)
## Sets up baseline hazard heights
lam1=c(.1,.1,.3,.1,.1)
## Runs function and returns a list of simulated data
X=SimUNIVPiecewise(x1,beta1,s1,lam1,1000)
X
```
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