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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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 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

RoxygenNote 5.0.1

NeedsCompilation no

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SimSCRPiecewise *SimSCRPiecewise*

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.

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

Lee, K. H., Haneuse, S., Schrag, D. and Dominici, F. (2015), Bayesian semiparametric analysis of semicompeting risks data: investigating hospital readmission after a pancreatic cancer diagnosis. Journal of the Royal Statistical Society: Series C (Applied Statistics), 64: 253-273.

Examples

```
##Set number of patients and covariate matrices
n=100
x1=matrix(rnorm(n*10,0,1),nrow=n)
x2=x1
x3=x1
##Sets up true covariate vectors
beta1=rnorm(10,0,1)
beta2=rnorm(10,0,1)
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,.3,.1,.1)
lam2=c(.2,.3,.1,.1)
lam3=c(.1,.3,.2,.2,.1)
gamma=rgamma(100,1,1)
##Runs Function and returns a list of simulated data
X=SimSCRPiecewise(x1,x2,x3,beta1,beta2,beta3,s1,s2,s3,lam1,lam2,lam3,gamma,1000)
X
```

SimUNIVPiecewise *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

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

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

Lee, K. H., Haneuse, S., Schrag, D. and Dominici, F. (2015), Bayesian semiparametric analysis of semicompeting risks data: investigating hospital readmission after a pancreatic cancer diagnosis. Journal of the Royal Statistical Society: Series C (Applied Statistics), 64: 253-273.

Examples

```
##Set number of patients and covariate matrices
n=100
x1=matrix(rnorm(n*10,0,1),nrow=n)
##Sets up true covariate vector
beta1=rnorm(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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