Package ‘peppm’
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Type Package
Title Piecewise Exponential Distribution with Random Time Grids
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Description Fits the Piecewise Exponential distribution with random time grids using the clustering structure of the Product Partition Models. Details of the implemented model can be found in Demarqui et al. (2008) <doi:10.1007/s10985-008-9086-0>.
License GPL (>= 2)
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findInt  
*Function to identify the times’ intervals*

**Description**

Function to identify the times’ intervals

**Usage**

```r
findInt(time, tgrid)
```

**Arguments**

- **time**: vector of times.
- **tgrid**: time grid of the PE distribution.

**Value**

indicator of times’s intervals

**Examples**

```r
data(telecom)
tgrid <- with(telecom, timeGrid(time, status))
tgrid
findInt(telecom$time, tgrid)
```

getGrid  
*Computes the time grid from the auxiliary vector U.*

**Description**

Computes the time grid from the auxiliary vector U.

**Usage**

```r
getGrid(U, ftgrid)
```

**Arguments**

- **U**: vector of change point indicators
- **ftgrid**: vector with the finest time grid (distinct observed failure times)

**Value**

the time grid associated with the auxiliary vector U.
**gibbs**  
*Runs the Gibbs sampler*

**Description**

Runs the Gibbs sampler

**Usage**

```r
gibbs(
  U0,  
  ftgrid,   
  time,    
  status,  
  a_rates, 
  b_rates, 
  cohesion, 
  a_beta,  
  b_beta,  
  npost,   
  nburnin, 
  nlag
)
```

**Arguments**

- `U0` vector of change point indicators
- `ftgrid` vector of indexes of distinct failure times
- `time` vector of observed failure times.
- `status` vector of failure indicators
- `a_rates` shape parameter of the gamma distribution (prior for failure rates).
- `b_rates` scale parameter of the gamma distribution (prior for failure rates).
- `cohesion` type of prior cohesion (1 to 4).
- `a_beta` shape1 parameter of the beta distribution (prior for p - cohesion 4).
- `b_beta` shape2 parameter of the beta distribution (prior for p - cohesion 4).
- `npost` desired posterior sample size
- `nburnin` number of iterations to be discarded.
- `nlag` number of jumps to eliminate autocorrelation of the chain.

**Value**

posterior sample
pehaz

Description

Hazard and cumulative hazard functions of the PE distribution

Usage

hpexp(x, tgrid, rates)

Hpexp(x, tgrid, rates)

Arguments

x vector of time points.
tgrid vector of time grid knots.
rates vector of failure rates.

Value

hpexp gives the hazard function and Hpexp gives the cumulative hazard function of the PE distribution.

peppm

Description

Piecewise Exponential Product Partition Model

Usage

peppm(
    time,
    status,
    a_rates = 1,
    b_rates = 1,
    cohesion = 1,
    a_beta = 1,
    b_beta = 1,
    nburnin = 10000,
    npost = 20000,
    nlag = 10
)
Arguments

time vector of observed failure times.
status vector of failure indicators
a_rates shape parameter of the gamma distribution (prior for failure rates).
b_rates scale parameter of the gamma distribution (prior for failure rates).
cohesion type of prior cohesion (1 to 4).
a_beta shape1 parameter of the beta distribution (prior for p - cohesion 4).
b_beta shape2 parameter of the beta distribution (prior for p - cohesion 4).
nburnin number of iterations to be discarded.
npost desired posterior sample size
nlag number of jumps to eliminate autocorrelation of the chain.

Value

Posterior sample of the number of intervals, failure rates, the auxiliary vector U, and the logarithm of the prior predictive distribution (log data factor).

Examples

# Small chain used here due to time constraints.
data(telecom)

# Prior cohesion 1:
fit1 <- with(telecom, peppm(time, status, cohesion=1, nburnin = 0, nlag = 1, npost = 100))
# Prior cohesion 2:
fit2 <- with(telecom, peppm(time, status, cohesion=2, nburnin = 0, nlag = 1, npost = 100))
# Prior cohesion 3:
fit3 <- with(telecom, peppm(time, status, cohesion=3, nburnin = 0, nlag = 1, npost = 100))
# Prior cohesion 4:
fit4 <- with(telecom, peppm(time, status, cohesion=4, nburnin = 0, nlag = 1, npost = 100))
Usage

dpexp(x, tgrid, rates, log = FALSE)

ppexp(q, tgrid, rates, lower.tail = TRUE, log.p = FALSE)

qpexp(p, tgrid, rates, lower.tail = TRUE, log.p = FALSE)

rpexp(n, tgrid, rates)

Arguments

x vector of time points.
tgrid vector of time grid knots.
rates vector of failure rates.
log, log.p logical; if TRUE, probabilities p are given as log(p).
q vector of quantiles.
lower.tail logical; if TRUE (default), probabilities are \( P[X \leq x] \); otherwise, \( P[X > x] \).
p vector of probabilities.
n number of random values to return.

Value

dpexp gives the (log) probability function, ppexp gives the (log) distribution function, qpexp gives the quantile function, and rpexp generates random deviates.

Examples

n <- 10
tgrid <- c(0, 1, 3, 7, Inf)
rates <- c(0.5, 4, 0.8, 0.1)
x <- sort(rpexp(n, tgrid=tgrid, rates=rates))
Fx <- ppexp(x, tgrid, rates)
y <- qpexp(Fx, tgrid, rates)
# checking:
x == y
timeGrid

Format

A data frame with 125 rows and 2 variables:

- time: vector of failure times (in days)
- status: vector of failure indicator

Author(s)

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References


Examples

```r
library(peppm)
data(telecom)
fit1 <- with(telecom, peppm(time, status, cohesion=1, nburnin=0, nlag=1, npost=100))
fit2 <- with(telecom, peppm(time, status, cohesion=2, nburnin=0, nlag=1, npost=100))
fit3 <- with(telecom, peppm(time, status, cohesion=3, nburnin=0, nlag=1, npost=100))
fit4 <- with(telecom, peppm(time, status, cohesion=4, nburnin=0, nlag=1, npost=100))
# time grid associated with the first line of the matrix U:
```

timeGrid

Time grid for the PE distribution

Description

This function make use of the observed times and failure indicators to create a time grid for the PE distribution.

Usage

```r
timeGrid(time, status, n.int = NULL)
```

Arguments

- time: Vector of failure times
- status: Vector of failure indicators
- n.int: Optional. Number of intervals. If NULL, the number of intervals is set to be equal to the number of distinct observed failure times.

Value

the time grid needed to specify the PE distribution.
Examples

data(telecom)
tgrid1 <- with(telecom, timeGrid(time, status))
tgrid1
tgrid2 <- with(telecom, timeGrid(time, status, n.int = 4))
tgrid2
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