Package 'NPHMC'

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Type Package

Title Sample Size Calculation for the Proportional Hazards Mixture Cure Model

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Description An R-package for calculating sample size of a survival trial with or without cure fractions.

Depends survival, smcure

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Contents

NPHMC-package *An R-package for Estimating Sample Size of Proportional Hazards Mixture Cure Model*

Description

Estimating sample size for survival trial with or without cure fractions

Details

Package:	NPHMC
Type:	Package
Version:	2.2
Date:	2013-09-23
License:	GPL-2
LazyLoad:	yes

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References

S. Wang, J. Zhang, and W. Lu. Sample size calculation for the proportional hazards cure model. Statistics in medicine, 31:3959-3971, 2012

C. Cai, et al., smcure: An R-Package for estimating semiparametric mixture cure models. Computer Methods and Programs in Biomedicine, 108(3):1255-60, 2012

See Also

smcure

e1684szdata *Eastern Cooperative Oncology Group (ECOG) Data*

Description

Example data of nonparametric estimation approach with treatment as only covariate

Usage

```
data(e1684szdata)
```

Format

A data frame with 285 observations on the following 3 variables:

`Time` observed relapse-free time

`Status` censoring indicator (1 = event of interest happens, and 0 = censoring)

`X` arm indicator (1 = treatment and 0 = control)

Examples

```
data(e1684szdata)
```

f1 *Function One*

Description

The first integrate function

Usage

```
f1(t, survdist, k, lambda0)
```

Arguments

`t`	time variable
`survdist`	survival distribution of uncured patients. It can be "`exp`" or "`weib`".
`k`	if `survdist` = "`weib`", the shape parameter `k` needs to be specified. By default `k` = 1, which refers to the exponential distribution.

`lambda0` the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm.

The density function of Weibull distribution with shape parameter `k` and scale parameter λ_0 is given by

$$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$

for $t > 0$, and the corresponding survival distribution is

$$S(t) = \exp(-(\lambda_0 t)^k).$$

`f2` *Function Two*

Description

The second integrate function

Usage

```
f2(t, accrualtime, followuptime, accrualdist, survdist, k, lambda0)
```

Arguments

`t`	time variable
`accrualtime`	length of accrual period.
`followuptime`	length of follow-up time.
`accrualdist`	accrual pattern. It can be "`uniform`", "`increasing`" or "`decreasing`".
`survdist`	survival distribution of uncured patients. It can be "`exp`" or "`weib`".
`k`	if `survdist` = "`weib`", the shape parameter `k` needs to be specified. By default `k` = 1, which refers to the exponential distribution.
`lambda0`	the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm. The density function of Weibull distribution with shape parameter `k` and scale parameter λ_0 is given by $$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$ for $t > 0$, and the corresponding survival distribution is $$S(t) = \exp(-(\lambda_0 t)^k).$$

f3 *Function Three*

Description

The third integrate function

Usage

```
f3(t, beta0, gamma0, pi0, survdist, k, lambda0)
```

Arguments

t	time variable
beta0	log hazard ratio of uncured patients
gamma0	log odds ratio of cure rates between two arms
pi0	cure rate for the control arm, which is between 0 and 1.
survdist	survival distribution of uncured patients. It can be "exp" or "weib".
k	if survdist = "weib", the shape parameter k needs to be specified. By default k = 1, which refers to the exponential distribution.
lambda0	the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm. The density function of Weibull distribution with shape parameter k and scale parameter λ_0 is given by $$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$ for $t > 0$, and the corresponding survival distribution is $$S(t) = \exp(-(\lambda_0 t)^k).$$

f4 *Function Four*

Description

The fourth integrate function

Usage

```
f4(t, accrualtime, followuptime, accrualdist, beta0, gamma0, pi0, survdist,
 k, lambda0)
```

Arguments

t	time variable
accrualtime	length of accrual period.
followuptime	length of follow-up time.
accrualdist	accrual pattern. It can be "uniform", "increasing" or "decreasing".
beta0	log hazard ratio of uncured patients
gamma0	log odds ratio of cure rates between the two arms
pi0	cure rate for the control arm, which is between 0 and 1.
survdist	survival distribution of uncured patients. It can be "exp" or "weib".
k	if survdist = "weib", the shape parameter k needs to be specified. By default k = 1, which refers to the exponential distribution.
lambda0	the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm. The density function of Weibull distribution with shape parameter k and scale parameter λ_0 is given by $$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$ for $t > 0$, and the corresponding survival distribution is $$S(t) = \exp(-(\lambda_0 t)^k).$$

H0 *Cumulative hazard function*

Description

Cumulative Hazard Function for Exponential and Weibull Distributions

Usage

```
H0(t, survdist, k, lambda0)
```

Arguments

t	time variable
survdist	survival distribution of uncured patients. It can be "exp" or "weib".
k	if survdist = "weib", the shape parameter k needs to be specified. By default k = 1, which refers to the exponential distribution.

`lambda0` the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm.

The density function of Weibull distribution with shape parameter `k` and scale parameter λ_0 is given by

$$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$

for $t > 0$, and the corresponding survival distribution is

$$S(t) = \exp(-(\lambda_0 t)^k).$$

`m` *M Function*

Description

M integrate function

Usage

```
m(t, beta0, gamma0, pi0, survdist, k, lambda0)
```

Arguments

`t`	time variable
`beta0`	log hazard ratio of uncured patients
`gamma0`	log odds ratio of cure rates between two arms
`pi0`	cure rate for the control arm, which is between 0 and 1.
`survdist`	survival distribution of uncured patients. It can be "`exp`" or "`weib`".
`k`	if `survdist` = "`weib`", the shape parameter `k` needs to be specified. By default `k` = 1, which refers to the exponential distribution.
`lambda0`	the scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm. The density function of Weibull distribution with shape parameter `k` and scale parameter λ_0 is given by $$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$ for $t > 0$, and the corresponding survival distribution is $$S(t) = \exp(-(\lambda_0 t)^k).$$

NPHMC *Title*

Description

Title

Usage

```
NPHMC(
  n = NULL,
  power = 0.8,
  alpha = 0.05,
  accrualtime = NULL,
  followuptime = NULL,
  p = 0.5,
  accrualdist = c("uniform", "increasing", "decreasing"),
  hazardratio = NULL,
  oddsratio = NULL,
  pi0 = NULL,
  survdist = c("exp", "weib"),
  k = 1,
  lambda0 = NULL,
  data = NULL
)
```

Arguments

n	sample size needed for power calculation
power	powered needed for sample size calculation
alpha	level of significance of statistical test (default is 0.05)
accrualtime	level of accrual period
followuptime	length of follow up time
p	proportion of subjects in treatment arm (default is 0.5)
accrualdist	accrual pattern (uniform, decreasing, increasing)
hazardratio	hazard ratio of uncured patients between two arms (must be greater than 0)
oddsratio	odds ratio of cured patients between two arms. It must be greater than 0. If it is 0, the model is reduced to standard proportional hazards model.
pi0	cure rate for the control arm (between 0 and 1)
survdist	distribution of uncured patients (exp or weib)
k	shape parameter if survdist = 'weib' (By default, it is 1 referrring to exponential distribution)
lambda0	scale parameter of exponential or Weibull distribution for survival times of uncured patients in the control arm.
data	observed or historical data if available

Value

a NPHMC object

Examples

```
NPHMC(power=0.90,alpha=0.05,accrualtime=3,followuptime=4,p=0.5,accrualdist="uniform",
hazardratio=2/2.5,oddsratio=2.25,pi0=0.1,survdist="exp",k=1,lambda0=0.5)
data(e1684szdata)
NPHMC(power=0.80,alpha=0.05,accrualtime=4,followuptime=3,p=0.5,accrualdist="uniform",
     data=e1684szdata)
n=seq(100, 500, by=50)
NPHMC(n=n, alpha=0.05,accrualtime=3,followuptime=4,p=0.5,
     accrualdist="uniform", hazardratio=2/2.5,oddsratio=2.25,pi0=0.1,survdist="exp",
     k=1,lambda0=0.5)
n=seq(100, 500, by=50)
NPHMC(n=n,alpha=0.05,accrualtime=4,followuptime=3,p=0.5,
     accrualdist="uniform",data=e1684szdata)
```

S0 *S0 Function*

Description

Baseline survival function for mixture cure model

Usage

```
S0(t, pi0, survdist, k, lambda0)
```

Arguments

t	time variable
pi0	cure rate for the control arm, which is between 0 and 1.
survdist	survival distribution of uncured patients. It can be "exp" or "weib".
k	if survdist = "weib", the shape parameter k needs to be specified. By default k = 1, which refers to the exponential distribution.
lambda0	scale parameter of exponential distribution or Weibull distribution for survival times of uncured patients in the control arm. The density function of Weibull distribution with shape parameter k and scale parameter λ_0 is given by $$f(t) = \lambda_0 k(\lambda_0 t)^{k-1} \exp(-(\lambda_0 t)^k),$$ for $t > 0$, and the corresponding survival distribution is $$S(t) = \exp(-(\lambda_0 t)^k).$$

Sc *Sc Function*

Description

Survival distribution of censoring times

Usage

```
Sc(t, accrualtime, followuptime, accrualdist)
```

Arguments

t	time variable
accrualtime	length of accrual period.
followuptime	length of follow-up time.
accrualdist	accrual pattern. It can be "uniform", "increasing" or "decreasing".

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