Package 'CoxSubTest'

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Type Package

Title CoxSubTest

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Description Maximum likelihood ratio test is proposed for Cox proportional hazard models with a change plane. Different testing methods are provided in this package.

License GPL (>=2)

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`CoxSubTestLRT` *The likelihood ratio test for Cox proportional hazard model with a change plane.*

Description

The likelihood ratio test for Cox proportional hazard model with a change plane.

Usage

```
CoxSubTestLRT(
  data,
  Gamma,
  B = 1000,
  K = 1000,
  qlb = 0.1,
  tol = 1e-08,
  seed = 1,
  maxs = 20,
  saveall = FALSE
)
```

Arguments

data	A list, including y (time response), x (predictors), z (predictors), u (grouping variables), status (censoring indicator).
Gamma	A matrix for initial gamma values. If not given then it will be automatically generated based on the data.
B	A constant. Number of bootstrap samples. Default is 1000.
K	A constant. The number of the initial gamma values. Default is 1000.
qlb	A constant. The lower quantile specified for Z%*%gamma.initials. Default is 0.1.
tol	A constant. The precision of the Newton method. Default is 1e-8.
seed	A constant. The number of seeds for generating the initial gamma values. Default is 1.
maxs	A constant. The maximum number of iterations in Newton method. Default is 20.
saveall	A logical value. Whether to save the results corresponding to all the gamma initial values. Default is FALSE.

Value

A list.

- TestR - The value of test statistic.
- TestB - B values of test statistic obtained from the bootstrap.
- Pval - The p-value of the test.
- TestRVEC - K values of test statistic based on K initial gamma values if saveall is set as TRUE.
- TestBmat - B*K values of test static obtained from the bootstrap based on K initial gamma values if saveall is set as TRUE.
- time - Running time.

Examples

```
n = 100
p1 = 2
p2 = 1
p3 = 3
```

```
alpha = rep(1, p1)
beta  = rep(1, p2)/2
gamma = c(1, seq(-1,1,length.out = p3-1))
rho = 0.3
cenRate = 0.2
data = generate_cox_data(n, alpha, beta, gamma, rho, cenRate = cenRate)
fit <- CoxSubTestLRT(data)
Cox Change plane test by LRT
```

`CoxSubTestST` *The score test for Cox proportional hazard model with a change plane in Kang et al.(2017).*

Description

The score test for Cox proportional hazard model with a change plane in Kang et al.(2017).

Usage

```
CoxSubTestST(
  data,
  Gamma,
  B = 1000,
  K = 1000,
  qlb = 0.1,
  tol = 1e-08,
  seed = 1,
  saveall = FALSE
)
```

Arguments

`data`	A list, including y (time response), x (predictors), z (predictors), u (grouping variables), status (censoring indicator).
`Gamma`	A matrix for initial gamma values. If not given then it will be automatically generated based on the data.
`B`	A constant. Number of bootstrap samples. Default is 1000.
`K`	A constant. The number of the initial gamma values. Default is 1000.
`qlb`	A constant. The lower quantile specified for Z%*%gamma.initials. Default is 0.1.
`tol`	A constant. The precision of the Newton method. Default is `1e-8`.
`seed`	A constant. The number of seeds for generating the initial gamma values. Default is 1.
`saveall`	A logical value. Whether to save the results corresponding to all the gamma initial values. Default is FALSE.

Value

A list.

- TestR - The value of test statistic.
- TestB - B values of test statistic obtained from the bootstrap.
- Pval - The p-value of the test.
- TestRVEC - K values of test statistic based on K initial gamma values if saveall is set as TRUE.
- TestBmat - B*K values of test static obtained from the bootstrap based on K initial gamma values if saveall is set as TRUE.
- time - Running time.

Examples

```
n = 100
p1 = 2
p2 = 1
p3 = 3
alpha = rep(1, p1)
beta  = rep(1, p2)/2
gamma = c(1, seq(-1,1,length.out = p3-1))
rho = 0.3
cenRate = 0.2
data = generate_cox_data(n, alpha, beta, gamma, rho, cenRate = cenRate)
fit <- CoxSubTestST(data)
Cox Change plane test by ST
```

`CoxSubTestSUP` *The SUP test for Cox proportional hazard model with a change plane in Deng et al.(2022).*

Description

The SUP test for Cox proportional hazard model with a change plane in Deng et al.(2022).

Usage

```
CoxSubTestSUP(
  data,
  Gamma,
  B = 1000,
  K = 1000,
  qlb = 0.1,
  tol = 1e-08,
  seed = 1
)
```

Arguments

data	A list, including y (time response), x (predictors), z (predictors), u (grouping variables), status (censoring indicator).
Gamma	A matrix for initial gamma values. If not given then it will be automatically generated based on the data.
B	A constant. Number of bootstrap samples. Default is 1000.
K	A constant. The number of the initial gamma values. Default is 1000.
qlb	A constant. The lower quantile specified for Z%*%gamma.initials. Default is 0.1.
tol	A constant. The precision of the Newton method. Default is 1e-8.
seed	A constant. The number of seeds for generating the initial gamma values. Default is 1.

Value

A list.

- TestR - The value of test statistic.
- TestB - B values of test statistic obtained from the bootstrap.
- Pval - The p-value of the test.
- time - Running time.

Examples

```
n = 100
p1 = 2
p2 = 1
p3 = 3
alpha = rep(1, p1)
beta  = rep(1, p2)/2
gamma = c(1, seq(-1,1,length.out = p3-1))
rho = 0.3
cenRate = 0.2
data = generate_cox_data(n, alpha, beta, gamma, rho, cenRate = cenRate)
fit <- CoxSubTestSUP(data)
Cox Change plane test by SUP
```

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gam.init.sub *Function to select initial gamma values spanning its space*

Description

Function to select initial gamma values spanning its space

Usage

```
gam.init.sub(q, n.initials)
```

Arguments

n.initials	Number of gamma values.
Z	The grouping variables.
lb.quantile	The lower quantile specified for Z%*%gamma.initials.
ub.quantile	The upper quantile specified for Z%*%gamma.initials.
ss	A positive integer with n.initials/ss indicating how many sets of gamma are chosen, default to 1.

Value

A matrix. A set of gamma values selected for defining subgroup.

Examples

```
n = 100
p1 = 2
p2 = 1
p3 = 3
alpha = rep(1, p1)
beta  = rep(1, p2)/2
gamma = c(1, seq(-1,1,length.out = p3-1))
rho = 0.3
cenRate = 0.2
data = generate_cox_data(n, alpha, beta, gamma, rho, cenRate = cenRate)
K = 1000
qlb = 0.1
cols = apply(data$u, 2, var) != 0
Gamma = gam.init(K, data$u[,cols], lb.quantile=qlb, ub.quantile=1-qlb, ss=1)
```

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generate_cox_data *Function for generating data from Cox proportional hazard model with a change plane.*

Description

Function for generating data from Cox proportional hazard model with a change plane.

Usage

```
generate_cox_data(
  n,
  alpha,
  beta,
  gamma,
  rho,
  cenRate = 0.1,
  censortype = c("RightCensor", "RandomCensor")
)
```

Arguments

n	A constant. The sample size.
alpha	A vector. The true parameter for baseline covariates.
beta	A vector. The true parameter denoting the heterogeneous effect of the subgroup.
gamma	A vector. The true parameter for grouping variables.
rho	A constant. The strength of correlation among covariates.
cenRate	A constant. Censoring rate. Default is 0.1.
censortype	Censroing type, including "RightCensor" and "RandomCensor".

Value

A list

- y - A length n vector. The survival time.
- x - A matrix. The baseline covariates.
- z - A matrix. The baseline covariates.
- u - A matrix. The grouping variables.
- status - A length n vector. Censoring indicator.

Examples

```
n = 100
p1 = 2
p2 = 1
p3 = 3
alpha = rep(1, p1)
beta  = rep(1, p2)/2
gamma = c(1, seq(-1,1,length.out = p3-1))
rho = 0.3
cenRate = 0.2
data = generate_cox_data(n, alpha, beta, gamma, rho, cenRate = cenRate)
```

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