

Package ‘isoph’

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Type Package

Title Isotonic Proportional Hazards Model

Version 1.1.3

Date 2018-11-24

Author Yunro Chung [cre]

Maintainer Yunro Chung <yunro.chung@asu.edu>

Description Nonparametric estimation of an isotonic covariate effect for proportional hazards model.

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License GPL (>= 2)

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isoph-package	<i>Isotonic Proportional Hazards Model</i>
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Maintainer: Yunro Chung <yunro.chung@asu.edu>

References

Yunro Chung, Anastasia Ivanova, Michael M. Hudgens, Jason P. Fine (2018), Partial likelihood estimation of isotonic proportional hazards models, *Biometrika*, 105(1), 133-148.

isoph

Fit Isotonic Proportional Hazards Model

Description

Nonparametric estimation of an isotonic covariate effect for proportional hazards model.

Usage

```
isoph(formula, trt, data, shape, K, maxdec, maxiter, eps)
```

Arguments

formula	a formula object: a response ~ a univariate covariate. The response must be survival outcome using the Surv function in the survival package.
trt	Treatment group. It must be coded by 0 or 1. This argument is optional.
data	data.frame or list that includes variables named in the formula argument.
shape	direction of the covariate effect on the hazard function, "increasing" or "decreasing".
K	an anchor constraint is imposed at K (default is 0).
maxdec	maximum number of decimal for output (default is 2).
maxiter	maximum number of iteration (default is 10 ⁴).
eps	stopping convergence criteria (default is 10 ⁻³).

Details

The isoph function allows to analyze isotonic proportional hazards model, defined as

$$\lambda(t|z, trt) = \lambda_0(t) \exp(\psi(z) + \beta trt),$$

where λ_0 is a baseline hazard function, ψ is an isotonic function, z is a univariate variable, β is a regression parameter and trt is a binary treatment group variable. One point has to be fixed with $\psi(K) = 0$, where K is an anchor point. A direction of ψ is defined as monotone increasing or monotone decreasing in Z prior to data analysis. Pseudo iterative convex minorant algorithm is used.

Author(s)

Yunro Chung [cre], Anastasia Ivanova, Michael G. Hudgens and Jason P. Fine

References

Yunro Chung, Anastasia Ivanova, Michael M. Hudgens, Jason P. Fine, Partial likelihood estimation of isotonic proportional hazards models, *Biometrika*. In print.

Examples

```
###
# 1. time-independent covariate with monotone increasing effect
###
# 1.1. create a test data set 1
test1=list(
  time= c(2, 5, 1, 7, 9, 5, 3, 6, 8, 9, 7, 4, 5, 2, 8),
  status=c(0, 1, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 0, 1),
  z=    c(2, 1, 1, 3, 5, 6, 7, 9, 3, 0, 2, 7, 3, 9, 4)
)

# 1.2. Fit isotonic proportional hazards model
res1 = isoph(Surv(time, status)~z, data=test1, shape="increasing")

# 1.3. print result
print(res1)
plot(res1)

###
# 2. time-independent covariate with monotone increasing effect and treatment group
###
# 2.1. create a test data set 1
test2=list(
  time= c(2, 5, 1, 7, 9, 5, 3, 6, 8, 9, 7, 4, 5, 2, 8),
  status=c(0, 1, 0, 1, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1),
  z=    c(2, 1, 1, 3, 5, 6, 7, 9, 3, 0, 2, 7, 3, 9, 4),
  trt=  c(1, 1, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 0)
)

# 2.2. Fit isotonic proportional hazards model
res2 = isoph(Surv(time, status)~z, trt=trt, data=test2, shape="increasing")
```

```
# 2.3. print result  
print(res2)  
plot(res2)
```

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*Topic **Isotonic regression, Survival
analysis, Constrained
estimation**

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