

Package ‘isoph’

June 12, 2017

Type Package

Title Isotonic Proportional Hazards Model

Version 1.1.1

Date 2017-06-11

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

Maintainer Yunro Chung <ychung@fredhutch.org>

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

Depends R (>= 3.0.2), Iso, survival

License GPL (>= 2)

Encoding UTF-8

LazyData true

NeedsCompilation no

Repository CRAN

Date/Publication 2017-06-11 22:01:50 UTC

R topics documented:

isoph-package	1
isoph	2

Index	5
--------------	-------------------

isoph-package	<i>Isotonic Proportional Hazards Model</i>
---------------	--

Description

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

Details

Package: isoph
 Type: Package
 Version: 1.1.1
 Date: 2017-06-11
 License: GPL (>= 2)

Author(s)

Yunro Chung [cre], Anastasia Ivanova, Michael G. Hudgens and Jason P. Fine
 Maintainer: Yunro Chung <ychung@fredhutch.org>

References

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

isoph	<i>Fit Isotonic Proportional Hazards Model</i>
-------	--

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. Time-dependent covariate is allowed with interval data. 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* (accepted).

Examples

```
#require(survival)
#require(Iso)

###
# 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")

# 2.3. print result
print(res1)

# 1.4 Figure
plot(res1, which=1) #which=1 for psi.hat (default)
plot(res1, which=2) #which=2 for hazard ratio, i.e. exp(psi.hat)

###
# 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, 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)

# 2.4 Figure
plot(res2, which=1) #which=1 for psi.hat (default)
plot(res2, which=2) #which=2 for hazard ratio, i.e. exp(psi.hat)

###
#3. More arguments for plot.isoph
###
# 3.1 renames labels
#plot(res2, main="Iso PH", ylab="Iso", xlab="Cov", lglab="Cov wt obs", lgloc="center", lgcex=1.5)

# 3.2 removes labels and changes line and point parameters
#plot(res2, main=NA, ylab=NA, xlab=NA, lglab=NA, lty=2, lcol=2, lwd=2, pch=3, pcol=4, pcex=1.5)
```

Index

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

isoph, [2](#)

isoph-package, [1](#)

isoph, [2](#)

isoph-package, [1](#)