Package 'uniah'

December 30, 2016

Title Unimodal Additive Hazards Model

Type Package

Version 1.0

Date 2016-12-28

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

Maintainer Yunro Chung <ychung@fredhutch.org>

Description Nonparametric estimation of a unimodal or U-shape covariate effect under additive hazards model.

Depends R (>= 3.0.2), Iso, ahaz, survival

License GPL (>= 2)

NeedsCompilation no

Repository CRAN

Date/Publication 2016-12-30 10:15:49

R topics documented:

`uniah-package` *Fit Unimodal Additive Hazards Model*

Description

Nonparametric estimation of a unimodal or U-shape covariate effect for additive hazard model.

Details

Package:	uniah
Type:	Package
Version:	1.0
Date:	2016-12-28
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, Shape restricted addtive hazards model (in preparation).

`uniah` *Fit Unimodal Additive Hazards Model*

Description

Nonparametric estimation of a unimodal or U-shape covariate effect for additive hazard model.

Usage

```
uniah(formula, trt, data, shape, mode, M, maxdec, maxiter, eps)
```

Arguments

`formula`	a formula object: a response ~ a univariate covariate. The response must be survival outcome unsing the Surv function.
`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, "unimodal" or "ushape"
`mode`	mode of the unimodal or ushape hazard function, "known" or "unknown" (default is "unknown").
`M`	A value for mode, which is only requred when mode="known".
`maxdec`	maximum number of decisimal for output (default is 3).
`maxiter`	maximum number of iteration (default is 10^3).
`eps`	stopping convergence criteria (default is 10^-3).

Details

The uniah function allows to analyze shape restricted additive hazards model, defined as

$$\lambda(t|z, trt) = \lambda 0(t) + \psi(z) + \beta trt,$$

where $\lambda 0$ is a baseline hazard function, and ψ is a unimodal or ushaped function, z is a univariate variable, β is a regression parameter and trt is a binary treatment group variable. One point at mode is fixed with $\psi(M) = 0$. For known mode, M has to be prespecified. For unknown mode, M does not have to be fixed. A direction of ψ is defined as unimodal or ushape prior to data analysis. Monotone covariate effects are also considered by setting a mode to the left or right end point of Z. Quadratic pool adjacent violators 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, Shape restricted addtive hazards model (in preparation).

Examples

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

###
# 1. unimodal with known mode
###
# 1.1. create a test data set
test1=list(
  time=  c(9, 7, 5, 9, 5, 3, 8, 7, 9, 7),
  status=c(1, 1, 0, 1, 0, 1, 1, 1, 1, 1),
  z=     c(2, 8, 1, 3, 2, 4, 4, 6, 8, 3)
)

# 1.2. Fit isotonic proportional hazards model
res1=uniah(Surv(time,status)~z, data=test1, shape='unimodal', mode='known', M=5)

# 1.3. print result
res1

# 1.4 figure
plot(res1)

###
# 2. unimodal with known mode with treatment group
###
# 2.1. create a test data set 1
test1=list(
```

```
  time=  c(2, 7, 3, 7, 8, 1, 2, 2, 9, 8),
  status=c(1, 0, 1, 1, 1, 0, 0, 1, 1, 0),
  z=     c(4, 9, 5, 5, 1, 3, 8, 8, 1, 2),
  trt=   c(1, 1, 1, 1, 1, 0, 0, 0, 0, 0)
)

# 2.2. Fit isotonic proportional hazards model
res2=uniah(Surv(time,status)~z, trt=trt, data=test1, shape='unimodal', mode='known', M=6)

# 2.3. print result
res2

# 2.4 figure
plot(res2)

###
# 3. ushape with unknown mode
###
# 3.1. create a test data set
test3=list(
  time=  c(3, 4, 5, 4, 1, 8, 1, 9, 2, 8, 2, 5, 7, 2, 2, 3, 3, 1, 1, 8),
  status=c(1, 0, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1),
  z=     c(10,4, 6, 9, 2, 9, 9, 7, 6, 1, 2, 2, 7, 4, 8, 5, 7,10, 4, 8)
)

# 3.2. Fit isotonic proportional hazards model
res3=uniah(Surv(time,status)~z, data=test3, shape='ushape', mode='unknown')

# 3.3 print result
res3

# 3.4 Figure
plot(res3)

###
# 4. More arguments for plot.uniah (S3method)
###
# 4.1 renames labels
#plot(res3, main="Ush", ylab="RD", xlab="Cov", lglab="Cov wt obs", lgloc="center", lgcex=1.5)

# 4.2 removes labels and changes line and point parameters
#plot(res3, main=NA, ylab=NA, xlab=NA, lglab=NA, lty=2, lcol=2, lwd=2, pch=3, pcol=4, pcex=1.5)
```

Index