Package: uniah (via r-universe)

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Title Unimodal Additive Hazards Model

Type Package

Version 1.2

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

Depends R (>= 4.2.0), Iso, ahaz, survival

License GPL (>= 2)

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uniah-package *Fit Unimodal Additive Hazards Model*

Description

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

Details

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License:	GPL (>= 2)

Author(s)

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References

Yunro Chung, Anastasia Ivanova, 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, ψ is a unimodal or U-shaped function, z is a univariate variable, β is a regression parameter, and trt is a binary treatment group variable. One point at mode has to be fixed with $\psi(M) = 0$ for model identifiability. For known mode (mode="known"), M has to be prespecified, and (ψ, β) is estimated given the prespecified M. For unknown mode (mode="unknown"), M is not needed, and (ψ, β, M) is estimated by profiling all hypothetical modes. 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.

Value

A list of class isoph:

est	results.
psi	estimated ψ at z
beta	estimated β.
conv	algorithm convergence status.
M	Predetermined model if mode="known" or estimated mode if mode="unknown".
shape	Direction of ψ.
call	Specified arguments that are specified in the model.

Author(s)

Yunro Chung [aut, cre]

References

Yunro Chung, Anastasia Ivanova, Jason P. Fine, Shape restricted addtive hazards model (in preparation).

Examples

```
###
# 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
test2=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=test2, 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
###
# 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)
```

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