

# Package ‘uniah’

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**Title** Unimodal Additive Hazards Model

**Type** Package

**Version** 0.4

**Date** 2016-01-05

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**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

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uniah-package	<i>Fit Unimodal Additive Hazards Model</i>
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## Description

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**Details**

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**Author(s)**

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

Yunro Chung, Anastasia Ivanova, Michael M. Hudgens, Jason P. Fine, Shape restricted additive hazards model (in preparation).

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 uniah

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*Fit Unimodal Additive Hazards Model*


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**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 using 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 required when mode="known".
maxdec	maximum number of decimal for output (default is 3).
maxiter	maximum number of iteration (default is 10 <sup>3</sup> ).
eps	stopping convergence criteria (default is 10 <sup>-3</sup> ).

## 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  $\psi$  is a unimodal or ushaped function,  $z$  is a univariate variable,  $\beta$  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  $\psi$  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

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## 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)

```

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\*Topic **Unimodal regression, Survival  
analysis, Constrained  
estimation**

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