Package 'aisoph'

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Type Package

Title Additive Isotonic Proportional Hazards Model

Version 0.4

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Description
Nonparametric estimation of additive isotonic covariate effects for proportional hazards model.

License GPL (>= 2)

Depends R (>= 4.2.0), Iso, survival

NeedsCompilation no

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`aisoph-package` *Additive Isotonic Proportional Hazards Model*

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Author(s)

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References

Yunro Chung, Anastasia Ivanova, Jason P. Fine, Additive isotonic proportional hazards models (working in progress).

`aisoph` *Fit Additive Isotonic Proportional Hazards Model*

Description

Nonparametric estimation of additive isotonic covariate effects for proportional hazards model.

Usage

```
aisoph(time, status, z1, z2, x, shape1, shape2, K1, K2, maxiter, eps)
```

Arguments

`time`	survival time. It must be greater than 0.
`status`	censoring indication. It must be 0 or 1.
`z1`	First covariate under order-restriction.
`z2`	Second covariate under-order restriction.
`x`	Additional covariates (vector or data.frame). This argument is optional
`shape1`	Shape-restriction for $z1$, "increasing" or "decreasing".
`shape2`	Shape-restriction for $z2$, "increasing" or "decreasing".
`K1`	anchor constraint for $z1$.
`K2`	anchor constraint for $z2$.
`maxiter`	maximum number of iteration (default is 10^5).
`eps`	stopping convergence criteria (default is 10^-3).

Details

The aisoph function allows to analyze additive isotonic proportional hazards model, which is defined as

$$\lambda(t|z1, z2, x) = \lambda0(t)exp(\psi1(z1) + \psi2(z2) + \beta x),$$

where $\lambda0$ is an unspecified baseline hazard function, $\psi1$ and $\psi2$ are monotone increasing (or decreasing) functions in $z1$ and $z2$, respectively, x is a covariate, and β is a regression paramter. If x is omitted in the formulation above, $\psi1$ and $\psi2$ are only estimated.

The model is not identifiable without the anchor constraint, $\psi1(K1) = 0$ and $\psi2(K2) = 0$. By default, $K1$ and $K2$ are set to medians of $z1$ and $z2$ values, respectively. The choice of the anchor points is less important in the sense that hazard ratios do not depend on the anchors.

Value

A list of class isoph:

`iso1`	data.frame estimated $\psi1$, estimated $\exp(\psi1)$, and cens at $z1$, where $\exp(\psi1)$ is a hazard ratio between $z1$ and $K1$, and cens="no" if (at least one) subject is not censored at $z1$ or cens="yes" otherwise.
`iso2`	data.frame estimated $\psi2$, estimated $\exp(\psi2)$, and cens at $z2$, where $\exp(\psi2)$ is a hazard ratio between $z2$ and $K2$, and cens="no" if (at least one) subject is not censored at $z2$ or cens="yes" otherwise.
`est`	data.frame with estimated β, and $\exp(\beta)$.
`conv`	status of algorithm convergence.
`shape1`	shape-constrain for $\psi1$.
`shape2`	shape-constrain for $\psi2$.
`K1`	anchor point for K1.
`K2`	anchor point for K2.

Author(s)

Yunro Chung [aut, cre]

References

Yunro Chung, Anastasia Ivanova, Jason P. Fine, Additive isotonic proportional hazards models (working in progress).

Examples

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

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

```
status=c(1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1)
z1=     c(3, 1, 2, 4, 8, 3, 3, 4, 1, 9, 4, 2, 2, 8, 5)
z2=     c(1, 3, 5, 6, 1, 7, 6, 8, 3, 4, 8, 8, 5, 2, 3)

# 1.2. Fit isotonic proportional hazards model
res1 = aisoph(time=time, status=status, z1=z1, z2=z2,
              shape1="increasing", shape2="increasing")

# 1.3. print result
res1

#1.4. plot
plot(res1)

###
# 2. time-independent covariate with monotone increasing effect
###
# 2.1. create a test data set 1
time=  c(0,4,8,9,5,6,9,8,2,7,4,2,6,2,5,9,4,3,8,2)
status=c(0,1,0,1,1,1,1,1,1,1,1,1,1,1,1,1,1,0,1)
z1=    c(3,2,1,1,3,1,8,4,3,6,2,9,9,0,7,7,2,3,4,6)
z2=    c(3,6,9,9,4,3,9,8,4,7,2,3,1,3,7,0,1,6,4,1)
trt=   c(0,0,0,0,0,0,0,0,0,0,1,1,1,1,1,1,1,1,1,1)

# 2.2. Fit isotonic proportional hazards model
res2 = aisoph(time=time, status=status, z1=z1, z2=z2, x=trt,
              shape1="increasing", shape2="increasing")

# 2.3. print result
res2

#2.4. plot
plot(res2)
```

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