

# Package ‘ivsacim’

October 28, 2020

**Type** Package

**Title** Structural Additive Cumulative Intensity Models with IV

**Version** 1.0

**Date** 2020-10-09

**Author** Andrew Ying

**Maintainer** Andrew Ying <aying9339@gmail.com>

**Description**

An instrumental variable estimator under structural cumulative additive intensity model is fitted, that leverages initial randomization as the IV. We also provide a consistent variance estimate.

**License** GPL (>= 2)

**Imports** Rcpp (>= 1.0.5), survival, lava, timereg

**LinkingTo** Rcpp

**Depends** R (>= 3.5.0)

**RoxygenNote** 7.1.0

**Encoding** UTF-8

**NeedsCompilation** yes

**Repository** CRAN

**Date/Publication** 2020-10-28 08:40:02 UTC

## R topics documented:

ivsacim . . . . .	2
plot.ivsacim . . . . .	3
summary.ivsacim . . . . .	4

<b>Index</b>	<b>6</b>
--------------	----------

---

ivsacim	<i>Fitting a Cumulative Intensity Model for Exposure Effect with Instrumental Variables</i>
---------	---

---

### Description

ivsacim is used to fit cumulative intensity models for exposure effects with instrumental variables.

### Usage

```
ivsacim(
  time,
  event,
  instrument,
  IV_valid = TRUE,
  treatment_init,
  treatment_shift_time = NULL,
  covar = NULL,
  max_time = NULL,
  max_time_bet = NULL,
  n_sim = 0
)
```

### Arguments

time	the censored event time
event	event indicator
instrument	the instrumental variable
IV_valid	whether assuming IV satisfies the exclusion restriction
treatment_init	the initial treatment assignment
treatment_shift_time	the shift time of each subject, if no shift for a subject, set as 0
covar	the baseline covariates
max_time	the max time that we threshold
max_time_bet	the max time that we threshold
n_sim	the number of resampling, set as 0 if no resampling is needed

### Value

ivsacim returns an object of class "tivsacim". An object of class "ivsacim" is a list containing the following components:

stime	an estimate of the baseline hazards function
dB_D	an estimate of the baseline hazards function

B_D	an estimate of the coefficients
beta	an estimate of the baseline hazards function
B_D_se	an estimate of the variance covariance matrix of coef
beta_se	an estimate of the baseline hazards function
by_prod	a byproduct, that will be used by other functions

### Examples

```
n = 200
event = rbinom(n, 1, 0.8)
IV = rbinom(n, 1, 0.5)
trt_init = IV
trt_shift = rep(0, n)
time = rexp(n)/(0.5 + trt_init * 0.2)
max_t = 3
max_t_bet = 3
n_sim = 0
fit <- ivsacim(time, event, IV, IV_valid = TRUE, trt_init,
trt_shift, covar = NULL, max_t, max_t_bet, n_sim)
```

---

plot.ivsacim	<i>Plotting Estimated Cumulative Intensity function with Pointwise Confidence Intervals</i>
--------------	---

---

### Description

The function will plot the estimated cumulative intensity function of the treatment after fitting. Corresponding pointwise confidence intervals at level alpha are also included.

### Usage

```
## S3 method for class 'ivsacim'
plot(x, gof = FALSE, ...)
```

### Arguments

x	the fitting object after fitting IVSACIM model
gof	whether to draw the goodness-of-fit plot
...	the other arguments you want to put in the built-in plot function

### Value

No return value, called for side effects

**Examples**

```

n = 200
event = rbinom(n, 1, 0.8)
IV = rbinom(n, 1, 0.5)
trt_init = IV
trt_shift = rep(0, n)
time = rexp(n)/(0.5 + trt_init * 0.2)
max_t = 3
max_t_bet = 3
n_sim = 100
fit <- ivsacim(time, event, IV, IV_valid = TRUE, trt_init,
trt_shift, covar = NULL, max_t, max_t_bet, n_sim)
plot(fit, main = "", xlab = "Time", ylab = "Cumulative Intensity Function")
plot(fit, gof = TRUE, xlab = "Time", ylab = "")

```

---

summary.ivsacim	<i>Summarizing Cumulative Intensity Function of Treatment with Instrumental Variables Estimation Using Structural Additive Cumulative Intensity Models</i>
-----------------	--

---

**Description**

summary method for class "ivsacim".

**Usage**

```

## S3 method for class 'ivsacim'
summary(object, digits = 3, ...)

## S3 method for class 'summary.ivsacim'
print(x, digits = 3, ...)

```

**Arguments**

object	an object of class "ivsacim", usually, a result of a call to ivsacim.
digits	number of digits we want to show
...	further arguments passed to or from other methods.
x	an object of class "summary.ivsacim", usually, a result of a call to summary.ivsacim.

**Details**

print.summary.ivsacim tries to be smart about formatting coefficients, an estimated variance covariance matrix of the coefficients, Z-values and the corresponding P-values.

**Value**

The function summary.ivsacim computes and returns a list of summary statistics of the fitted model given in object.

**Examples**

```
n = 200
event = rbinom(n, 1, 0.8)
IV = rbinom(n, 1, 0.5)
trt_init = IV
trt_shift = rep(0, n)
time = rexp(n)/(0.5 + trt_init * 0.2)
max_t = 3
max_t_bet = 3
n_sim = 0
fit <- ivsacim(time, event, IV, IV_valid = TRUE, trt_init,
trt_shift, covar = NULL, max_t, max_t_bet, n_sim)
summary(fit)
```

# Index

`ivsacim`, [2](#)

`plot.ivsacim`, [3](#)

`print.summary.ivsacim`  
    (`summary.ivsacim`), [4](#)

`summary.ivsacim`, [4](#)