Package ‘csci’

May 8, 2026

Type Package

Title Current Status Confidence Intervals

Version 0.9.3

Date 2020-12-02

Author Sungwook Kim

Maintainer Michael P. Fay `<mfay@niaid.nih.gov>`

Description Calculates pointwise confidence intervals for the cumulative distribution function of the event time for current status data, data where each individual is assessed at one time to see if they had the event or not by the assessment time.

License GPL-3

Depends R (>= 3.5.0), exactci

NeedsCompilation no

Repository CRAN

Date/Publication 2020-12-07 09:40:05 UTC

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`csci-package` *Current Status Confidence Intervals*

Description

Calculates pointwise confidence intervals for the cumulative distribution function of the event time for current status data, data where each individual is assessed at one time to see if they had the event or not by the assessment time.

Details

The DESCRIPTION file:

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Version:	0.9.3
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`controlCSCI`	`Function for control parameters for algorithms used in CSCI.`
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`hepABulg`	`Hepatitis A Data from Bulgaria`

The package only has one main function `CSCI` and one data set `hepABulg`.

Author(s)

Sungwook Kim

Maintainer: Michael P. Fay <mfay@niaid.nih.gov>

`controlCSCI` *Function for control parameters for algorithms used in CSCI.*

Description

Allows chainging of default parameters.

Usage

```
controlCSCI(power = 2/3,
   quan_p = c(0.25, 0.5, 0.75, 0.8, 0.85, 0.9, 0.95, 0.99),
  xp_hat = c(0.06402, 0.28506, 0.80694, 0.98729, 1.22756, 1.60246, 2.26916, 3.8363),
   intF = 1000)
```

Arguments

`power`	for defining m in the algorithm when `type='VALID'`: m=ceiling(n^power), where n=length(C)
`quan_p`	quantile associated with xp_hat, used when `type='LIKELIHOOD'`
`xp_hat`	estimated quantile of the distribution of the log likelihood ratio (see e.g., Table 2 of Banerjee and WWellner, 2001), used when `type='LIKELIHOOD'`
`intF`	numer of intervals to partition the F space (F=c(1:(intF-1)/intF)), used when `type='LIKELIHOOD'`

Details

For `power`, see Kim, et al 2020. For details on the other values, see the code for the `type='LIKELIHOOD'` algorithm and Banerjee and Wellner, 2001.

Value

A list of the argument values.

References

Banerjee, M. and J. A. Wellner (2001). Likelihood ratio tests for monotone functions. Ann. Statist. 29 (6), 1699-1731.

Kim, S, Fay, MP, Proschan, MA (2020). Valid and Approximately Valid Confidence Intervals for Current Status Data. (see `https://arxiv.org/abs/1805.06488`).

`CSCI` *Pointwise Confidence Intervals for Current Status Data*

Description

Calculates several different methods for getting pointwise confidence intervals for current st

Usage

```
CSCI(C, D, times=NULL, type = c("VALID", "ABA", "LIKELIHOOD"),
   conf.level = 0.95, control=controlCSCI())
```

Arguments

`C`	a vector of assessement times
`D`	a vector of indicators of event at or before the assessment time
`times`	a vector of times, t, to give the confidence interval for the event time distribution, F(t). If NULL then set to `sort(unique(C))`.
`type`	type of confidence interval, either "VALID", "ABA", or "LIKELIHOOD" (see details)

`conf.level`	confidence level for intervals (for `type="LIKELIHOOD"` only specific values are allowed, see note)
`control`	list with parameters for algorithms, see `controlCSCI`

Details

The function does three types of pointwise confidence intervals for the cumulative distribution function for the event time at the times specified by `times`. When `type="VALID"` the function gives a method that guarantees that the coverage will be at least nominal, but the confidence intervals are not ensured to be monotonic over the times of interest. When `type="ABA"` the function gives an approximate method that does not guarantee coverage, but has been shown by simulation to have good coverage for smoothly changing distributions, and it does ensure monotonicity (see Kim, et al, 2020). When `type="LIKELIHOOD"` the function gives an asymptotic likelihood ratio test-based confidence interval that does not guarantee coverage (Banerjee and Wellner, 2001).

Value

A list with 2 objects:

`ciTable_all`	data.frame with NPMLE and associated confidence intervals for all possible time values (not output for type='LIKELIHOOD')
`ciTable_times`	data.frame with NPMLE and assoicated confidence intervals for the values of 'times' argument

Note

Because the likelihood ratio test goes to a non-standard asymptotic distribution, we do not calculate quantiles from that distribution, but take them from Table 2 of Banerjee and Wellner (2001). Because of this, when `type="LIKELIHOOD"` then conf.level must be one of 0.25,0.50,0.75,0.80,0.85,0.90,0.95, or 0.99.

Author(s)

Sungwook Kim

References

Banerjee, M. and J. A. Wellner (2001). Likelihood ratio tests for monotone functions. Ann. Statist. 29 (6), 1699-1731.

Kim, S, Fay, MP, Proschan, MA (2020). Valid and Approximately Valid Confidence Intervals for Current Status Data. (see `https://arxiv.org/abs/1805.06488`).

Examples

```
data(hepABulg)
CSCI(C=hepABulg$age,D=hepABulg$testPos,type="VALID")
```

`hepABulg` *Hepatitis A Data from Bulgaria*

Description

Hepatitis A data from Bulgaria, collected from school-children and blood donors by Prof. G. Frosner, Munich (from Keiding, 1991, Table 1).

Usage

```
data("hepABulg")
```

Format

A data frame with 850 observations on the following 2 variables.

`age` a numeric vector

`testPos` a numeric vector, Hepatitis A positive=1, or not=0

Details

Each row in the data frame represents an individual and the age tested in years and the results of the hepatitis A test (1=positive, 0=negative). Ages of the individuals range from 1 to 86 years old.

Source

Keiding, N (1991). Age-specific Incidence and Prevalence: a Statistical Perspective. JRSS A 154(3): 371-412 (Table 2).

Examples

```
data(hepABulg)
head(hepABulg)
```

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