Package 'DTDA.cif'

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Title Doubly Truncated Data Analysis, Cumulative Incidence Functions

Version 1.0.2

Maintainer José Carlos Soage González <jsoage@uvigo.es>

Description Nonparametric estimator of the cumulative incidences of competing risks under double truncation. The estimator generalizes the Efron-Petrosian NPMLE (Non-Parametric Maximun Likelihood Estimator) to the competing risks setting. Efron, B. and Petrosian, V. (1999) <doi:10.2307/2669997>.

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License GPL-2

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Author Jacobo de Uña Álvarez [aut],
José Carlos Soage González [cre]

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DTDA.cif-package *Doubly Truncated Data Analysis, Cumulative Incidence Functions*

Description

Nonparametric estimator of the cumulative incidences of competing risks under double truncation. The estimator generalizes the Efron-Petrosian NPMLE (Non-Parametric Maximun Likelihood Estimator) to the competing risks setting.

Details

- Package: 'DTDA.cif'
- Version: 1.0.2
- Maintainer: José Carlos Soage González <jsoage@uvigo.es>
- License: GPL-2

Value

- 'DTDAcif'
- 'plot.DTDAcif'
- 'summary.DTDAcif'

Acknowledgements

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- José Carlos Soage was supported by Grupos de Referencia Competitiva, Consolidación y Estructuración de Unidades de Investigación Competitivas del SUG, Cons. de Cultura, Educación e OU, Xunta de Galicia (GRC ED431C 2016/040).

Author(s)

- de Uña-Álvarez, Jacobo.
- Soage González, José Carlos.
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References

- de Uña-Álvarez, J. (2019). Nonparametric estimation of the cumulative incidences of competing risks under double truncation. Preprint.
- Efron, B. and Petrosian, V. (1999). Nonparametric methods for doubly truncated data. Journal of the American Statistical Association 94, 824-834.

DTDAcif *Doubly Truncated Data Analysis, Cumulative Incidence Functions*

Description

This function computes a nonparametric estimator of the cumulative incidences of competing risks under double truncation. The estimator generalizes the Efron-Petrosian NPMLE (Non-Parametric Maximun Likelihood Estimator) to the competing risks setting.

Usage

```
DTDAcif(x, u, v, comp.event, method = c("indep", "dep"), boot = F,
  B = 300, N.iter = 100, error = 1e-06)
```

Arguments

x	Numeric vector corresponding to the variable of ultimate interest.
u	Numeric vector corresponding to the left truncation variable.
v	Numeric vector corresponding to the right truncation variable.
comp.event	Competing risk indicator.
method	The method used to compute the nonparametric estimator. Use 'indep' for independent truncation variables and "dep" for truncation variables possibly depending on the competing risk.
boot	Logical. If TRUE the bootstrap standard deviation of the cumulative incidences is calculated.
B	Number of bootstrap replicates.
N.iter	Maximum number of iterations.
error	Error criterion for convergence.

Details

The nonparametric estimator is based on the Efron-Petrosian NPMLE (Efron and Petrosian, 1999). Actually, each pair (Xi,Zi) -where Xi stands for the variable of interest and Zi is the competing event indicator- is weighted by the jump of the Efron-Petrosian NPMLE at Xi (method="indep"), or by a normalized version of the Efron-Petrosian NPMLE computed from the subset of (Xs,Zs)'s such that Zs=Zi (method="dep"). The former is suitable when the truncating couple (U,V) is independent of (X,Z), while the latter is recommended when (U,V) and X are only conditionally independent given Z; see de Uña-Álvarez (2019) for a full description of the estimators and of their properties. When the competing event indicator is missing, the function simply computes the Efron-Petrosian NPMLE and the argument method has no role.

Value

A list containing:

- method: The method used to compute the estimator.
- biasf: The biasing function which reports the sampling probability for each Xi.
- cif.mas: The mass attached to each (Xi,Zi). The cumsum of cif.mas for Zi=j is the estimator of the j-th cumulative incidence function.
- data: The data corresponding to (X,Z) ordered with respect to X within each Z-value.
- sd.boot: The bootstrap standard deviation.

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Examples

```
set.seed(1234)
n <- 50  # sample size

x <- runif(n, 0, 1)  # time variable of interest
z <- rbinom(n, 1, 1 / 4)   # competing event indicator

# truncation variables

u <- runif(n, -.25, .5)  # left truncation variable
v <- u + .75   # right truncation variable

# note: (u,v) is independent of (x,z) so both estimation methods are consistent
```

```
# truncating the sample:

for (i in 1:n) {
  while (u[i] > x[i] | v[i] < x[i]) {
    x[i] <- runif(1, 0, 1)
    z[i] <- rbinom(1, 1, 1 / 4)
    u[i] <- runif(1, -.25, .5)
    v[i] <- u[i] + .75
  }
}

# note: (u,v) since is independent of (x,z)
# both estimation methods are consistent:

res.i <- DTDAcif(x, u, v, z, method = "indep", boot = TRUE)
res.d <- DTDAcif(x, u, v, z, method = "dep", boot = TRUE)

oldpar <- par(mfrow=c(1,2))
plot(res.i, main = "Indep trunc", intervals = TRUE)
plot(res.d, main = "Cond indep trunc", intervals = TRUE)

summary(res.i)
summary(res.d)

plot(res.i$data$x, res.i$biasf, type = "s")  # the observational bias
# the observational bias, event 1
plot(res.d$data$x[res.d$data$z == 1], res.d$biasf$biasf_1, type = "s")
# the observational bias, event 2
lines(res.d$data$x[res.d$data$z == 2], res.d$biasf$biasf_2, type = "s", col = 2)
par(oldpar)
```

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plot.DTDAcif *plot.DTDAcif*

Description

S3 method to plot a DTDAcif object by using the generic plot function.

Usage

```
## S3 method for class 'DTDAcif'
plot(x, intervals = FALSE, level = 0.95, main = "",
  xlab = "", ylab = "", ylim, xlim, ...)
```

Arguments

x	DTDAcif object.
intervals	Logical. If TRUE confidence intervals are calculated if standard deviation was calculated before.
level	Confidence level of the standard deviation of the cifs. Default is 0.95.
main	An overall title for the plot.
xlab	A title for the x axis.
ylab	A title for the y axis.
ylim	Limit over the y axis.
xlim	Limit over the x axis.
...	Additional parameters.

Author(s)

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- Soage González, José Carlos.
- Maintainer: José Carlos Soage González. <jsoage@uvigo.es>

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summary.DTDAcif *summary.DTDAcif*

Description

S3 method to summarize a DTDAcif object by using the generic summary function.

Usage

```
## S3 method for class 'DTDAcif'
summary(object, ...)
```

Arguments

object	DTDAcif object.
...	Additonal parameters.

Author(s)

- de Uña-Álvarez, Jacobo.
- Soage González, José Carlos.
- Maintainer: José Carlos Soage González. <jsoage@uvigo.es>

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