

# Package ‘DTDA.ni’

April 5, 2018

**Title** Doubly Truncated Data Analysis, Non Iterative

**Version** 1.0

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

**Description**

Non-iterative estimator for the cumulative distribution of a doubly truncated variable. de Uña-Álvarez J. (2018) <doi:10.1007/978-3-319-73848-2\_37>.

**Depends** R (>= 3.3.0)

**License** GPL-2

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 6.0.1

**Suggests** knitr, rmarkdown

**VignetteBuilder** knitr

**URL** <https://github.com/sidoruvigo/DTDA.ni>

**NeedsCompilation** no

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**Repository** CRAN

**Date/Publication** 2018-04-05 10:50:05 UTC

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DTDA.ni-package

Package 'DTDA.ni'

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## Description

Non-iterative estimator for the cumulative distribution of a doubly truncated variable, see de Uña-Álvarez (2018). Restricted to interval sampling.

## Details

Documentation for package 'DTDA.ni' version 1.0

- Package: DTDA.ni
- Version: 1.0
- Maintainer: José Carlos Soage González <jsoage@uvigo.es>
- License: GPL-2

## Value

- DTDA.ni: Implements a non-iterative estimator for the cumulative distribution of a doubly truncated variable
- plot.DTDA.ni: S3 method to plot a DTDA.ni object by using the generic plot function.

## Acknowledgements

- Jacobo de Uña-Álvarez was supported by Grant MTM2014-55966-P, Spanish Ministry of Economy and Competitiveness.
- José Carlos Soage was supported by Red Tecnológica de Matemática Industrial (Red TMATI), Cons. de Cultura, Educación e OU, Xunta de Galicia (ED341D R2016/051) and 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.

## References

de Uña-Álvarez J. (2018) A Non-iterative Estimator for Interval Sampling and Doubly Truncated Data. In: Gil E., Gil E., Gil J., Gil M. (eds) The Mathematics of the Uncertain. Studies in Systems, Decision and Control, vol 142. Springer, Cham, pp. 387-400.

**See Also**

Useful links:

- <https://github.com/sidoruvigo/DTDA.ni>

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DTDA*ni*
*Doubly Truncated Data Analysis, Non Iterative*


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**Description**

This function computes a non-iterative estimator for the cumulative distribution of a doubly truncated variable, see de Uña-Álvarez (2018). The function is restricted to interval sampling.

**Usage**

```
DTDAni(x, u, tau)
```

**Arguments**

<code>x</code>	Numeric vector corresponding the variable of ultimate interest.
<code>u</code>	Numeric vector corresponding to the left truncation variable.
<code>tau</code>	Sampling interval width. The right truncation values will be internally calculated as $v = u + \text{tau}$ .

**Details**

The function DTDA*ni* is adapted to the presence of ties. It can be used to compute the direct (*Fd*) and the reverse (*Fr*) estimators; see the example below. Both curves are valid estimators for the cumulative distribution (*F*) of the doubly truncated variable. Weighted estimators  $Fw = w * Fd + (1 - w) * Fr$  with  $0 < w < 1$  are valid too, the choice  $w = 1/2$  being recommended in practice (de Uña-Álvarez, 2018).

**Value**

A list containing:

<code>x</code>	The distinct values of the variable of interest.
<code>nx</code>	The absolute frequency of each <code>x</code> value.
<code>cumprob</code>	The estimated cumulative probability for each <code>x</code> value.
<code>P</code>	The auxiliary $P_i$ used in the calculation of the estimator.
<code>L</code>	The auxiliary $L_i$ used in the calculation of the estimator.

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### Examples

```
## Not run:
# Generating data which are doubly truncated:
N <- 250
x0 <- runif(N)           # Original data
u0 <- runif(N, -0.25, 0.5) # Left-truncation times
tau <- 0.75             # Interval width
v0 <- u0 + tau

x <- x0[u0 <= x0 & x0 <= v0]
u <- u0[u0 <= x0 & x0 <= v0]
v <- v0[u0 <= x0 & x0 <= v0]
n <- length(x) # Final sample size after the interval sampling

# Create an object with DTDAni function
res <- DTDAni(x, u, tau)
plot(res)

abline(a = 0, b = 1, col = "green") #the true cumulative distribution

# Calculating the reverse estimator:
res2 <- DTDAni(-x, -u - tau, tau)
lines(-res2$x, 1 - res2$cumprob, type = "s", col = "blue", lty = 2)

# Weigthed estimator (recommended):
w <- 1/2
```

```

k <- length(res$x)

Fw <- w * res$cumprob + (1 - w) * (1 - res2$cumprob[k:1])
lines(res$x, Fw, type = "s", col = 2)

# Using res$P and res$L to compute the estimator:

k <- length(res$x)
F <- rep(1, k)
for (i in 2:k){
  F[i] <- (F[i - 1] - res$P[i - 1]) / res$L[i - 1] + res$P[i - 1]
}

F0 <- F/max(F) # This is equal to res$cumprob

## End(Not run)

```

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plot.DTDAni

*plot.DTDAni*


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## Description

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

## Usage

```

## S3 method for class 'DTDAni'
plot(x, ecdf = FALSE, ...)

```

## Arguments

x	DTDAni object.
ecdf	Whether to display the ordinary empirical cumulative distribution function or not. Default = FALSE.
...	Additional parameters.

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v0 <- u0 + tau

x <- x0[u0 <= x0 & x0 <= v0]
u <- u0[u0 <= x0 & x0 <= v0]
v <- v0[u0 <= x0 & x0 <= v0]
n <- length(x) # Final sample size after the interval sampling
res <- DTDAni(x, u , tau)
plot(res)
plot(res, ecdf = TRUE)

## End(Not run)
```

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