Package ‘presmTP’

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Type    Package
Title   Methods for Transition Probabilities
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Description Provides a function for estimating the transition probabilities in an illness-death model. The transition probabilities can be estimated from the unsmoothed landmark estimators developed by de Una-Alvarez and Meira-Machado (2015) <doi:10.1111/biom.12288>. Presmoothed estimates can also be obtained through the use of a parametric family of binary regression curves, such as logit, probit or cauchit. The additive logistic regression model and nonparametric regression are also alternatives which have been implemented. The idea behind the presmoothed landmark estimators is to use the presmoothing techniques developed by Cao et al. (2005) <doi:10.1007/s00180-007-0076-6> in the landmark estimation of the transition probabilities.

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Description

These are data from one of the first successful trials of adjuvant chemotherapy for colon cancer. Levamisole is a low-toxicity compound previously used to treat worm infestations in animals; 5-FU is a moderately toxic (as these things go) chemotherapy agent.

Usage

```r
data("colonIDM")
```

Format

A data frame with 929 observations on the following 15 variables. Below a brief description is given for some of these variables.

- **time1**: Time to recurrence/censoring/death, whichever occurs first.
- **event1**: Recurrence/censoring indicator (recurrence=1, alive=0).
- **Stime**: Time to censoring/death, whichever occurs first.
- **event**: Death/censoring indicator (death=1, alive=0).
- **rx**: Treatment - Observation, Levamisole, Levamisole+5-FU.
- **sex**: Sex indicator (male=1, female=0).
- **age**: Age in years.
- **obstruct**: Obstruction of colon by tumour.
- **perfor**: Perforation of colon.
- **adhere**: Adherence to nearby organs.
- **nodes**: Number of lymph nodes with detectable cancer.
- **differ**: Differentiation of tumour (1=well, 2=moderate, 3=poor).
- **extent**: Extent of local spread (1=submucosa, 2=muscle, 3=serosa, 4=contiguous structures).
- **surg**: Time from surgery to registration (0=short, 1=long).
- **node4**: More than 4 positive lymph nodes.

Source

The study is originally described in Laurie (1989). The main report is found in Moertel (1990). This data set is closest to that of the final report in Moertel (1991). A version of the data with less follow-up time was used in the paper by Lin (1994).
References


Examples

```r
data(colonIDM)
head(colonIDM)
```

### plot.pstp

Plot for an object of class "pstp"

#### Description

It draws the estimated probabilities.

#### Usage

```r
## S3 method for class 'pstp'
plot(x = object, state_ini = 0, ...)
```

#### Arguments

- `x`: A fitted pstp object as produced by presmTP.
- `state_ini`: Initial state of the transition. Defaults to state_ini=0
- `...`: For future methods.

#### Value

No value is returned.

#### Author(s)

Gustavo Soutinho, Luis Meira-Machado, Pedro Oliveira.
Examples

```r
res <- presmTP(data = colonIDM, s = 365, method = "uns")
plot(res)
```

### Description

This function is used to obtain unsmoothed and presmoothed estimates of the transition probabilities in the illness-death model.

### Usage

```r
presmTP(data, s, method = "uns", estimand = "S",
    bw.selec = "plug-in", fixed.bw = NULL, bound = "none")
```

### Arguments

- **data**: A numeric value to be squared.
- **s**: The first time for obtaining estimates for the transition probabilities.
- **method**: The method used to compute the transition probabilities. Possible options are "uns", "np", "logit", "logit.gam", "probit" and "cauchit". Defaults to "uns".
- **estimand**: An optional character string identifying the function to estimate: "S" for survival function and "H" for cumulative hazard function. Defaults to "S".
- **bw.selec**: An optional (partially matched) character string specifying the method of bandwidth selection. "fixed" if no bandwidth selection is done, in which case the bandwidth(s) given by the fixed.bw argument is (are) used, "plug-in" for plug-in bandwidth selection and "bootstrap" for bootstrap bandwidth selection. Defaults to "fixed".
- **fixed.bw**: An optional numeric vector with the fixed bandwidth(s) used when the value of the bw.selec argument is "fixed". It must be of length 1 for estimating survival and cumulative hazard functions, and of length 2 for density and hazard functions (in this case, the first element is the presmoothing bandwidth).
- **bound**: An optional numeric vector with the fixed bandwidth(s) used when the value of the bw.selec argument is "fixed". It must be of length 1 for estimating survival and cumulative hazard functions, and of length 2 for density and hazard functions (in this case, the first element is the presmoothing bandwidth).
Value
An object of class "pstp" and one of the following classes: "uns", "np", "logit", "logit.gam", "probit" and "cauchit". Objects are implemented as a list with elements:

- est0: data.frame with estimates of the transition probabilities 0->0, 0->1 and 0->2.
- est1: data.frame with estimates of the transition probabilities 1->1 and 1->2.
- s: The first time for obtaining estimates for the transition probabilities.
- callp: The expression of the estimated probability.
- call: A call object.

Author(s)
Gustavo Soutinho, Luis Meira-Machado, Pedro Oliveira.

References


Examples

```r
#Unsmoothed
res1<- presmTP(data = colonIDM, s = 365,method = "uns")
res1$est0$t
res1$est0$p02
res1$est1$t
summary(res1, state_ini=1, time=365*1:5)
plot(res1)
res1$call
class(res1)

#Nonparametric
res2<- presmTP(data = colonIDM, s = 365,method = "np")
res3<- presmTP(data = colonIDM, s = 365,method = "np", estimand="S")
res4<- presmTP(data = colonIDM, s = 365,method = "np", estimand="H")
res5<- presmTP(data = colonIDM, s = 365,method = "np",
               bw.selec="fixed", fixed.bw=30)

#Presmoothed - Logit
```
res6 <- presmTP(data = colonIDM, s = 365, method = "logit")
summary(res6, state_ini = 1, time = 365*1:5)
# Presmoothed - Logit GAM
res7 <- presmTP(data = colonIDM, s = 365, method = "logit.gam")

<table>
<thead>
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<tr>
<td><strong>Summarizing fits of 'pstp' class</strong></td>
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**Description**

Returns a data.frame or list containing the estimates of the probabilities.

**Usage**

```r
## S3 method for class 'pstp'
summary(object, state_ini = 0, times = NULL, ...)
```

**Arguments**

- `object` A fitted pstp object as produced by presmTP.
- `state_ini` Initial state of the transition. Defaults to state_ini = 0.
- `times` Vector of times; the returned data frame will contain 1 row for each time.
- `...` For future methods.

**Value**

A data frame or a list containing the estimates of the probability.

**Author(s)**

Gustavo Soutinho, Luis Meira-Machado, Pedro Oliveira.

**Examples**

```r
res <- presmTP(data = colonIDM, s = 365, method = "uns")
summary(res, state_ini = 1, times = 365*1:5)
```
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