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.

Depends R (>= 3.0.0)

Encoding UTF-8

License GPL-3

LazyData true

Imports survPresmooth, mgcv

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NeedsCompilation no

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R topics documented:

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colonIDM   *Chemotherapy for Stage B/C colon cancer.*

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

```
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 - Obs(ervation), Lev(amisole), Lev(amisole)+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

JA Laurie, CG Moertel, TR Fleming, HS Wieand, JE Leigh, J Rubin, GW McCormack, JB Gerstner, JE Krook and J Malliard. Surgical adjuvant therapy of large-bowel carcinoma: An evaluation of levamisole and the combination of levamisole and fluorouracil: The North Central Cancer Treatment Group and the Mayo Clinic. Journal of Clinical Oncology, 7:1447-1456, 1989.

DY Lin. Cox regression analysis of multivariate failure time data: the marginal approach. Statistics in Medicine, 13:2233-2247, 1994.

CG Moertel, TR Fleming, JS MacDonald, DG Haller, JA Laurie, PJ Goodman, JS Ungerleider, WA Emerson, DC Tormey, JH Glick, MH Veeder and JA Maillard. Levamisole and fluorouracil for adjuvant therapy of resected colon carcinoma. New England Journal of Medicine, 332:352-358, 1990.

CG Moertel, TR Fleming, JS MacDonald, DG Haller, JA Laurie, CM Tangen, JS Ungerleider, WA Emerson, DC Tormey, JH Glick, MH Veeder and JA Maillard. Fluorouracil plus Levamisole as and effective adjuvant therapy after resection of stage II colon carcinoma: a final report. Annals of Internal Medicine, 122:321-326, 1991.

Examples

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

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plot.pstp	*Plot for an object of class "pstp"*

Description

It draws the estimated probabilities.

Usage

```
## 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

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

---

presmTP   *Methods for estimation of transition probabilities in the illness-death*
                                model

Description

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

Usage

```
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

Aalen O. O., Johansen S. (1978) An Empirical Transition Matrix for Nonhomogeneous Markov Chains Based on Censored Observations. Scandinavian Journal of Statistics 5(3), 141–150.

Cao, R., Lopez-de-Ullibarri, I., Janssen, P. and Veraverbeke, N. (2005). Presmoothed Kaplan-Meier and Nelson-Aalen estimators, Journal of Nonparametric Statistics, 17, 31-56.

Meira-Machado L. F., de Una-Alvarez J. and Cadarso-Suarez C. (2006). Nonparametric estimation of transition probabilities in a non-Markov illness-death model. Lifetime Data Anal 12(3), 325–344.

Lopez-de-Ullibarri, I and Jacome, M. A. (2013). survPresmooth: An R Package for Presmoothed Estimation in Survival Analysis, Journal of Statistical Software, 54(11), 1-26. URL: http://www.jstatsoft.org/v54/i11/.
de Una-Alvarez J. and Meira-Machado L. (2015). Nonparametric estimation of transition probabilities in a non-Markov illness-death model: a comparative study. Biometrics 71, 364–375.

Meira-Machado, L. (2016). Smoothed landmark estimators of the transition probabilities, SORT-Statistics and Operations Research Transactions, 40, 375-398.

Examples

```
#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" )
```

---

summary.pstp   *Summarizing fits of "pstp" class*

Description

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

Usage

```
## 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

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

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