Package 'vcPB'

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Type Package

Title Longitudinal PB Varying-Coefficient Groupwise Disparity Model

Version 1.1.1

Description Estimating the disparity between two groups based on the extended model of the Peters-Belson (PB) method. Our model is the first work on the longitudinal data, and also can set a varying variable to find the complicated association between other variables and the varying variable. Our work is an extension of the Peters-Belson method which was originally published in Peters (1941)<doi:10.1080/00220671.1941.10881036> and Belson (1956)<doi:10.2307/2985420>.

Depends KernSmooth, rlist, lme4, methods

License GPL-3

Encoding UTF-8

RoxygenNote 7.2.3

URL https://github.com/SangkyuStat/vcPB,
https://sangkyustat.github.io/vcPB/

BugReports https://github.com/SangkyuStat/vcPB/issues

NeedsCompilation no

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pb *Peters-Belson Disparity Analysis*

Description

Function pb offers Peters-Belson(PB) type of regression method which gets the disparity between a majority group and a minority group based on various regression models.

Usage

```
pb(formula, group, data, family = "gaussian")
```

Arguments

formula	a formula for the model.
group	a vector within the data which is used for separating majority and minority groups.
data	a data frame and data has to be included with the form of data.frame.
family	a character indicating which model should be used. Details can be found later.

Value

pb returns an object of class "pb", which is a list containing following components:

call	a matched call.
overall_disparity	overall disparity between major and minor groups.
explained_disparity	explained disparity between major and minor groups.
unexplained_disparity	unexplained disparity between major and minor groups.
major	a majority group label.
minor	a minority group label.

vc.pb *Varying-Coefficient Disparity Decomposition Analysis for a Longitudinal Data*

Description

The vc.pb offers Peters-Belson(PB) type of nonparametric varying-coefficient regression method which measures the disparity between a majority group and a minority group for the longitudinal data.

Usage

```
vc.pb(
  formula,
  group,
  data,
  id,
  modifier = NULL,
  local_time = NULL,
  bandwidth_M = NULL,
  bandwidth_m = NULL,
  bandwidth_xM = NULL,
  bandwidth_xm = NULL,
  bandwidth_Z_M = NULL,
  bandwidth_Z_m = NULL,
  bandwidth_Z_xM = NULL,
  bandwidth_Z_xm = NULL,
  detail = FALSE,
  ...
)
```

Arguments

formula	a formula for the model.
group	a vector within the data which is used for separating majority and minority groups.
data	a data frame and data has to be included with the form of data.frame.
id	a vector within the data which is used for identifying the observations.
modifier	(optional) a vector from the data which is an optional argument to add the varying term into the model. The default is NULL. If the class of the vector is given as integer then, the continuous version of vc.PB is performed and if the class is factor or character, then the discrete version is proceeded. Three different sets of inputs are needed for different versions.
local_time	(optional) a vector used for the local points of time variable in the kernel regression.

bandwidth_M	(optional) a bandwidth for the time variable used for estimating the time-varying coefficient of the majority group.
bandwidth_m	(optional) a bandwidth for the time variable used for estimating the time-varying coefficient of the minority group.
bandwidth_xM	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix for the majority group.
bandwidth_xm	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix for the minority group.
bandwidth_Z_M	(optional) a bandwidth for the varying variable used for estimating the time-varying coefficient of the majority group. Used only when the class of modifier is integer.
bandwidth_Z_m	(optional) a bandwidth for the varying variable used for estimating the time-varying coefficient of the minority group. Used only when the class of modifier is integer.
bandwidth_Z_xM	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix related to varying variable for the majority group. Used only when the class of modifier is integer.
bandwidth_Z_xm	(optional) a vector of p number of bandwidths for estimating the local expectations of the design matrix related to varying variable for the minority group. Used only when the class of modifier is integer.
detail	a bool argument whether the detailed results are provided or not.
...	used for controlling the others.

Value

vc.pb returns an object of class "vc.pb", which is a list containing following components:

call	a matched call.
overall_disparity	overall disparity between major and minor groups.
explained_disparity	explained disparity between major and minor groups, this component is given only when varying is null.
explained_disparity_by_X	explained disparity from the variables without modifier variable given that the modifier variable is from the majority group, this component is given only when varying is not null.
explained_disparity_by_Z	explained disparity from modifier variable, this component is given only when varying is not null.
unexplained_disparity	unexplained disparity between major and minor groups.
times	local time points used for kernel regression.
major	a majority group label.
minor	a minority group label.

`modfier`, `varying.type`
: the modifier variable and the type of the modifier variable, these components are given only when `varying` is not null.

`bandwidths`
: various corresponding bandwidths. Please see the details or the attached reference for more information.

Author(s)

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Examples

```
set.seed(1)
n <- 100
x1 <- rnorm(n)
x2 <- rnorm(n)
time <- rep(1:5, 20) + runif(n)
y <- rnorm(n)
sub_id <- rep(1:25, 1, each = 4)
group <- rep(as.character(1:2), 25, each = 2)
z <- as.character(rbinom(n, 1, prob = 0.5))

data <- data.frame(y = y, x1 = x1, x2 = x2, z = z, group = group, time = time, sub_id = sub_id)

fit <- vc.pb(y ~ (x1|time) + x2, data = data, id = sub_id, group = group)
fit
```

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