Package: DBR (via r-universe)

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Type Package

Title Discrete Beta Regression

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Description Bayesian Beta Regression, adapted for bounded discrete responses, commonly seen in survey responses. Estimation is done via Markov Chain Monte Carlo sampling, using a Gibbs wrapper around univariate slice sampler (Neal (2003) <DOI:10.1214/aos/1056562461>), as implemented in the R package MfUSampler (Mahani and Sharabiani (2017) <DOI:10.18637/jss.v078.c01>).

License GPL (>= 2)

Depends R (>= 3.5.0)

Imports MfUSampler, methods, coda

NeedsCompilation no

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Contents

coda_wrapper	*Utility function to call MCMC diagnostic functions in the coda package*

Description

Utility function to call MCMC diagnostic functions in the coda package

Usage

```
coda_wrapper(dbr_obj, coda_function, ...)
```

Arguments

dbr_obj	An object of class dbr, typically the output of the function dbr.
coda_function	A function in the **coda** package, with first argument being an mcmc object.
...	Arguments to be passed to coda_function.

Value

The output of coda_function.

Author(s)

Mansour T.A. Sharabiani, Alireza S. Mahani

Examples

```
library("DBR")
library("coda")
data("pain")
est <- dbr(
  interference ~ severity + age
  , pain
  , control = dbr.control(
    nsmp = 50
    , nburnin = 25
  )
)
coda_wrapper(est, autocorr, lag = c(0, 5))
```

| dbr | *Discretised Beta Regression for Survey-Response Analysis* |

Description

Discretised Beta Regression for Survey-Response Analysis

Usage

```
dbr(
  formula
  , data
  , control = dbr.control()
  , yunique = NULL
  , wghts = rep(1, nrow(data))
)
dbr.control(
  nsmp = 100
  , nburnin = 50
  , estimate_left_buffer = FALSE
  , estimate_right_buffer = FALSE
  , buffer_max = 5.0
)
```

Arguments

formula	Standard R formula describing the response variable and predictors.
data	Data frame containing response and predictors as described in formula.
control	List of parameters for controlling the MCMC estimation.
yunique	Vector of values/levels that the response variable can assume. If not specified, this will be extracted from the data according to the formula.
wghts	Vector of weights to be applied during model estimation. Default is a uniform weight vector.
nsmp	Number of MCMC samples to collect, including the burnin phase.
nburnin	Number of initial MCMC samples to discard before calculating parameter estimates.
estimate_left_buffer	
	Boolean flag indicating whether to estimate a left buffer from the data.
estimate_right_buffer	
	Boolean flag indicating whether to estimate a right buffer from the data.
buffer_max	Maximum size of left/right buffer, only used if above flags are set to TRUE.

Value

An object of class dbr, which is a list containing the following fields:

formula	Same as input.
control	Same as input.
yunique	Same as input.
wghts	Same as input.
est	An internal object containing estimation results. Should not be accessed directly by user. Use summary and predict instead.
data	Same as input.

Author(s)

Mansour T.A. Sharabiani, Alireza S. Mahani

See Also

summary.dbr, predict.dbr

Examples

```
library("DBR")
data("pain")
est <- dbr(
  interference ~ severity + age
  , pain
  , control = dbr.control(
    nsmp = 50
    , nburnin = 25
  )
)
```

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pain	*Pain Data*

Description

Based on a survey of nearly 10,000 patients in UK health clinics during 2010-2014 to assess the quality of care they received.

Usage

```
data("pain")
```

Format

A data frame with 1318 observations on the following 3 variables.

severity Average of 4 responses, each on a 0-10 scale (11 levels). They measure patients' perception of pain severity - over the 7 days leading up to the survey - at (1) its worst, (2) at its least, (3) on average, and (4) right now.

interference Average of 7 scores, each on a 0-10 scale (11 levels). These questions measure - over the 7 days leading up to the survey - the level of interference of pain in patient's life along the following dimensions: (1) general activity, (2) mood, (3) walking ability, (4) normal work (outside of home and housework), (5) relations with other people, (6) sleep and (7) enjoyment of life.

age Age of respondents, in years.

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predict.dbr	*Predict method for Discretised Beta Regression Fits*

Description

Predict method for Discretised Beta Regression Fits

Usage

```
## S3 method for class 'dbr'
predict(
  object
  , newdata = NULL
  , type = c("sample", "point")
  , ...
)
```

Arguments

object	Standard R formula describing the response variable and predictors.
newdata	Data frame containing the predictors, matching the dbr call.
type	Whether to make point predictions or generate sample from the predictive distribution.
...	Further arguments passed to or from other methods.

Value

If type is 'point', this will be a vector of same length as nrow(newdata), with unique values consistent with the dbr call. If type is 'sample', this will be a 2D array of size nrow(data) x nsmp.

Author(s)

Mansour T.A. Sharabiani, Alireza S. Mahani

Examples

```
## Not run:

library("DBR")

data("pain")
est <- dbr(
  interference ~ severity + age
  , pain
  , control = dbr.control(
    nsmp = 200
    , nburnin = 100
  )
)

predict(est, type = "point")


## End(Not run)
```

S3 methods   *Summary, print, plot and coef methods for Discretised Beta Regression*
                          Fits

Description

Summary, print, plot and coef methods for Discretised Beta Regression Fits

Usage

```
## S3 method for class 'dbr'
coef(
  object
  , prob = c(0.025, 0.5, 0.975)
  , ...
)
## S3 method for class 'dbr'
print(
  x
  , ...
)
## S3 method for class 'dbr'
summary(
  object
  , context
  , make_plot = TRUE
  , ...
```

```
)
## S3 method for class 'dbr'
plot(x, ...)
```

Arguments

`object`	Result of call to dbr.
`x`	Result of call to dbr.
`prob`	Vector of probabilities at which to calculate the posterior quantiles of model parameters.
`make_plot`	Whether to generate the context-dependent plots in the `summary` method.
`context`	Dataframe with a single row, containing all columns needed for prediction. These values are used for producing pseudo-coefficient plots in the `summary` method.
`...`	Further arguments passed to the functions.

Value

For `coef`, a 2D array of size `length(prob)` x `nVar`, where `nVar` is the number of model parameters. The latter itself is composed of left and right buffers, precision parameter of beta distribution, and covariate coefficients. Note that if left and/or right buffers were not estimated by `dbr`, their confidence interval will be identical to the point estimate. The `print` method prints the formula used to call `dbr`.

Author(s)

Mansour T.A. Sharabiani, Alireza S. Mahani

Examples

```
library("DBR")
data("pain")
est <- dbr(
  interference ~ severity + age
  , pain
  , control = dbr.control(
    nsmp = 50
    , nburnin = 25
  )
)
print(est)
plot(est)
coef(est, prob = c(0.05, 0.5, 0.95))
summary(est, context = pain[2, ])
```

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