Package ‘lboxcox’

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Title Implementation of Logistic Box-Cox Regression
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Description Implements a logistic box-cox model. This model is fully described in Xing, L. et al. (2021) <doi:10.1002/cjs.11587>.
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| depress                         | Depression dataset |

Description

The depress data frame has 8,893 rows and 5 columns from the National Health and Nutrition Examination Survey (NHANES) 2009–2010.

Usage

depress

Format

Sample survey data

depression  binary response variable indicating whether the participant has depression (=1) or not (=0)
m mercury  a numeric vector giving the log-transformed total blood mercury in micro-grams per litre
age  0 if participant is female and 1 if they are male
gender  age of the participant
weight  a numeric vector giving the sampling-weight.

Source


Description

Train the given formula using a Logistic Box-Cox model.

Usage

lbc_train(
    formula,
    weight_column_name,
    data,
    init = NULL,
    svy_lambda_vector = seq(0, 2, length = 100),
    num_cores = 1
)
LogLikeFun

Arguments

- **formula**: A formula of the form $y \sim x + z_1 + z_2$ where $y$ is a binary response variable, $x$ is a continuous predictor variable, and $z_1, z_2, \ldots$ are covariates.
- **weight_column_name**: The name of the column in 'data' containing the survey weights.
- **data**: Dataframe containing the dataset to train on.
- **init**: Initial estimates for the coefficients. If NULL the svyglm model will be used.
- **svy_lambda_vector**: Values of lambda used in training svyglm model. Best model is used for initial coefficient estimates. If init is not NULL this parameter is ignored.
- **num_cores**: The number of cores used when finding the best svyglm model. If init is not NULL this parameter is ignored.

Value

Object of class ‘maxLik’ from the ‘maxLik’ package. Contains the coefficient estimates that maximizes likelihood among other statistics.

Note

This is reliant on the following work:


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LogLikeFun **Log Likelihood of Logistic Box-Cox**

Description

This function gives the log likelihood of the Box-Cox model. Main purpose is to be an input to the maxLik function.

Usage

LogLikeFun(bb, ixx, iyy, iw, iZZ)
Arguments

bb  current values for the intercept and slope coefficients
ixx  continuous predictor
iyy  binary outcome
iw  sample weight
iZZ  covariates to be incorporated in the model

Value

the log likelihood estimate for the coefficients in ‘bb’

median_effect  Calculates the "slope" of the Logistic Box-Cox model

Description

Calculates a number that represents the overall gradient measurement between the predictor and log-odds of the risk

Usage

median_effect(formula, weight_column_name, data, trained_model)

Arguments

formula  the formula used to train the logistic box-cox model
weight_column_name  the name of the column in ‘data’ containing the survey weights
data  dataframe containing the dataset to train on
trained_model  the already trained model. The output of ‘lbc_train’

ScoreFun  LogLikelihood Gradient of Logistic Box-Cox

Description

This function gives the gradient of the log likelihood of the Box-Cox model. Main purpose is to be an input to the maxLik function.

Usage

ScoreFun(bb, ixx, iyy, iw, iZZ)
ScoreFun

Arguments

bb  initial values for the intercept and slope coefficients
ixx  continuous predictor
iyy  binary outcome
iw  sample weight
iZZ  covariates to be incorporated in the model

Value

the gradient of the log likelihood estimate for the coefficients in ‘bb’
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