Package 'LLIC'

January 20, 2025

Title Likelihood Criterion (LIC) Analysis for Laplace Regression Model

Version 3.0.0

Date 2024-11-23

Description

Performs likelihood criterion analysis using the Laplace regression model to determine its optimal subset of variables. The methodology is based on Guo et al. (2023), LIC criterion for optimal subset selection in distributed interval estimation <doi:10.1080/02331888.2020.1823979>.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.3.2

Imports stats, VGAM, dplyr, LaplacesDemon, relliptical, ggplot2, rlang

NeedsCompilation no

Author Guangbao Guo [aut, cre],
Yaxuan Wang [aut]

Maintainer Guangbao Guo <ggb11111111@163.com>

Depends R (>= 3.5.0)

Repository CRAN

Date/Publication 2024-11-28 12:00:02 UTC

Contents

---

data_pc   *Data Processing for LLIC Analysis*

Description

This function processes the data generated for the LLIC analysis, including filtering, mutation, and selection of specific columns.

Usage

```
data_pc(data)
```

Arguments

data   A data frame containing the raw data generated for the LLIC analysis.

Value

A data frame with the following columns:

X1   The filtered values of the original 'X1' column, keeping only rows where 'X1 <= 2'.

X2   The original 'X2' column.

X1_squared   A new column containing the square of the 'X1' values.

Examples

```
set.seed(12)
library(dplyr)
library(VGAM)
raw_data <- data.frame(
  X1 = sample(1:3, 1200, replace = TRUE),
  X2 = sample(1:3, 1200, replace = TRUE),
  X3 = sample(1:3, 1200, replace = TRUE),
  X4 = sample(1:3, 1200, replace = TRUE),
  X5 = sample(1:3, 1200, replace = TRUE),
  Y = rlaplace(1200, 0, 1)
)
processed_data <- data_pc(raw_data)
```

LLIC   *LLIC for Lre Model*

Description

This function carries out an Laplace LIC analysis utilizing the Lre model.

Usage

```
LLIC(X, y, alpha, K)
```

Arguments

X	Design matrix
y	Random response vector of observed values
alpha	Significance level
K	Number of subsets

Value

A list containing the following components:

MUopt	A vector of the means of the predictor variables in the optimal subset.
Bopt	A vector of the estimated regression coefficients from the final model fitted to the optimal subset.
MAEMUopt	The Mean Absolute Error (MAE) for the optimal subset.
MSEMUopt	The Mean Squared Error (MSE) for the optimal subset.
opt	Currently NULL, a placeholder for potential future use.
Yopt	A vector of the predicted values from the final model fitted to the optimal subset.

Examples

```
set.seed(12)
library(VGAM)
X <- matrix(data = sample(1:3, 1200 * 5, replace = TRUE), nrow = 1200, ncol = 5)
b <- sample(1:3, 5, replace = TRUE)
e <- rlaplace(1200, 0, 1)
Y <- X %*% b + e
alpha <- 0.05
K <- 10
result <- LLIC(X, Y, alpha, K)
MUopt <- result$MUopt
Bopt <- result$Bopt
MAEMUopt <- result$MAEMUopt
MSEMUopt <- result$MSEMUopt
opt <- result$opt
Yopt <- result$Yopt
```

---

plot_LLIC   *advanced_plotting_LLIC for LLIC*

Description

This function visualizes the results of the LLIC analysis, including a comparison of actual and predicted values, and a bar chart of model coefficients.

Usage

```
plot_LLIC(X, Y, result)
```

Arguments

X	Design matrix used in the LLIC analysis.
Y	Random response vector of observed values used in the LLIC analysis.
result	A list containing the results of the Laplace LIC analysis from the LLIC function.

Value

A list containing two 'ggplot' objects:

Actual_vs_Pred	A scatter plot comparing the actual vs predicted values.
Coef	A bar chart displaying the model's coefficients.

Examples

```
set.seed(12)
library(VGAM)
library(rlang)
library(dplyr)
library(ggplot2)
X <- matrix(data = sample(1:3, 1200 * 5, replace = TRUE), nrow = 1200, ncol = 5)
b <- sample(1:3, 5, replace = TRUE)
e <- rlaplace(1200, 0, 1)
Y <- X %*% b + e
alpha <- 0.05
K <- 10
result <- LLIC(X, Y, alpha, K)
plot_LLIC(X, Y, result)
plots <- plot_LLIC(X, Y, result)
print(plots$Actual_vs_Pred)
print(plots$Coef)
```

Index