Package 'likelihoodTools'

Title Managing Results from Maximum Likelihood Estimation

Version 1.0.0

Description

Managing and exploring parameter estimation results derived from Maximum Likelihood Estimation (MLE) using the 'likelihood' package. It provides functions for organizing, visualizing, and summarizing MLE outcomes, streamlining statistical analysis workflows. By improving interpretation and facilitating model evaluation, it helps users gain deeper insights into parameter estimation and model fitting, making MLE result exploration more efficient and accessible. See Goffe et al. (1994) <doi:10.1016/0304-4076(94)90038-8> for details on MLE, and Canham and Uriarte (2006) <doi:10.1890/04-0657> for application of MLE using 'likelihood'.

License GPL (>= 3)

Encoding UTF-8

URL https://github.com/ajpelu/likelihoodTools,

https://ajpelu.github.io/likelihoodTools/

BugReports https://github.com/ajpelu/likelihoodTools/issues

Depends R (>= 4.1.0)

RoxygenNote 7.3.2

Imports dplyr, ggplot2, rlang

Suggests testthat (>= 3.0.0), likelihood, kableExtra, MASS, patchwork, spelling

Config/testthat/edition 3

Config/Needs/website rmarkdown

Language en-US

NeedsCompilation no

Author Antonio Jesus Perez-Luque [cre, aut, cph] (<https://orcid.org/0000-0002-1747-0469>)

Maintainer Antonio Jesus Perez-Luque <ajpelu@gmail.com>

Repository CRAN

Date/Publication 2025-03-04 12:40:02 UTC

Contents

---

mle_format	*Extract and format results from Simulated Annealing (Maximum Likelihood Estimation)*

Description

Extract and format results from Simulated Annealing (Maximum Likelihood Estimation)

Usage

```
mle_format(x, yvar)
```

Arguments

x	List with the results of the simulated annealing algorithm for Maximum Likelihood Estimation. See likelihood::anneal()
yvar	The name of the column that contains the dependent variable (the "observed" value). This column must be present in the source_data of the x (results) list

Value

A dataframe with outputs from the results of the simulated annealing maximum parameter estimation. This dataframe contains the following columns (see help in likelihood::anneal()):

- max_likeli The maximum likelihood value of the model

- n_params The number of the estimated parameters

- aic_corr The value of Akaike's Information Criterion "corrected" for small sample size. See the "Simulated Annealing Algorithm" help page of the likelihood package for more information.

- aic The value of Akaike's Information Criterion. See the "Simulated Annealing Algorithm" help page of the likelihood package for more information. slope Slope of observed values linearly regressed on those predicted by model, using the parameter maximum likelihood estimates. The intercept is forced at zero.

- R2 Proportion of variance explained by the model relative to that explained by the simple mean of the data.

- rmse Root Mean Square Error, *i.e.* the standard deviation of the residuals. It is computed as:

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N}(obs_i - exp_i)^2}{n-1}}$$

Examples

```
# Get the results of the maximum likelihood estimation from the example in
# the anneal function of the likelihood pkg.

library(likelihood)
data(crown_rad)
dataset <- crown_rad

# Create our model function
modelfun <- function (a, b, DBH) {a + b * DBH}

# Compute the MLE of the parameters
results <- anneal(model = modelfun,
  par = list(a = 0, b = 0),
  var = list(DBH = "DBH", x = "Radius", mean = "predicted",
             sd = 0.815585, log = TRUE),
  source_data = dataset,
  par_lo = list(a = 0, b = 0),
  par_hi = list(a = 50, b = 50),
  pdf = dnorm,
  dep_var = "Radius",
  max_iter = 20000,
  show_display = FALSE)

# Format the results
mle_format(results, yvar = "DBH")
```

---

mle_plot_observed   *Plots Observed vs. Predicted MLE*

Description

Plots observed values *vs.* predicted values. The predicted values are obtained from the model with
the parameters values estimated by maximum likelihood estimation using simulated annealing.

Usage

```
mle_plot_observed(
  x,
  yvar,
  annotate = TRUE,
  lab_x = "Observed",
  lab_y = "Predicted",
  ...
)
```

Arguments

x	List with the results of the simulated annealing algorithm for Maximum Likelihood Estimation. See `likelihood::anneal()`
yvar	The name of the column that contains the dependent variable (the "observed" value). This column must be present in the `source_data` of the x (results) list
annotate	logical (default to TRUE), display the values of R^2 and slope of the regression of the observed on predicted values. See `likelihood::Simulated Annealing Algorithm`
lab_x	The text for the x-axis lab
lab_y	The text for the y-axis lab
...	other ggplot2 parameters

Value

A `ggplot` object displaying the observed vs. predicted values, with optional annotations for R^2 and regression slope.

---

mle_plot_residuals   *Plots Residuals vs. Predicted MLE*

Description

Plots residuals (observed - residuals) values *vs.* predicted values. The predicted values are obtained from the model with the parameters values estimated by maximum likelihood estimation using simulated annealing.

Usage

```
mle_plot_residuals(
  x,
  yvar,
  lab_residuals = "Residuals",
  lab_predicted = "Predicted",
  ...
)
```

Arguments

x	List with the results of the simulated annealing algorithm for Maximum Likelihood Estimation. See `likelihood::anneal()`
yvar	The name of the column that contains the dependent variable (the "observed" value). This column must be present in the `source_data` of the x (results) list
lab_residuals	The text for the residual axis lab (y-axis)
lab_predicted	The text for the predicted axis lab (x-axis)
...	other ggplot2 parameters

Value

A `ggplot` object displaying the residuals vs. predicted values, with a horizontal line at zero.

Index