Package 'LRTesteR'

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Title Likelihood Ratio Tests and Confidence Intervals

Version 1.3.0

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Description A collection of hypothesis tests and confidence intervals based on the likelihood ratio <https://en.wikipedia.org/wiki/Likelihood-ratio_test>.

License GPL-3

Encoding UTF-8

Imports stats, rlang, statmod, stringr, EnvStats

RoxygenNote 7.3.2

Suggests covr, testthat, lmtest, knitr, rmarkdown, emplik, emplik2, datasets

VignetteBuilder knitr

URL https://github.com/gmcmacran/LRTesteR

BugReports https://github.com/gmcmacran/LRTesteR/issues

NeedsCompilation no

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Repository CRAN

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Contents

`beta_shape1_one_sample` *Test the shape1 parameter of a beta distribution.*

Description

Test the shape1 parameter of a beta distribution.

Usage

```
beta_shape1_one_sample(x, shape1, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
shape1	a number indicating the tested value of the shape1 parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rbeta(100, shape1 = 1, shape2 = 2)
beta_shape1_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rbeta(100, shape1 = 3, shape2 = 2)
beta_shape1_one_sample(x, 1, "greater")
```

---

beta_shape1_one_way *Test the equality of shape 1 parameters of beta distributions.*

Description

Test the equality of shape 1 parameters of beta distributions.

Usage

```
beta_shape1_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All shape1s are equal. (shape1_1 = shape1_2 ... shape1_k).
- Alternative: At least one shape1 is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rbeta(150, 1, 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
beta_shape1_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rbeta(50, 1, 2), rbeta(50, 2, 2), rbeta(50, 3, 2))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
beta_shape1_one_way(x, fctr, .95)
```

---

beta_shape2_one_sample

Test the shape2 parameter of a beta distribution.

Description

Test the shape2 parameter of a beta distribution.

Usage

```
beta_shape2_one_sample(x, shape2, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
shape2	a number indicating the tested value of the shape2 parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rbeta(100, shape1 = 1, shape2 = 1)
beta_shape2_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rbeta(100, shape1 = 1, shape2 = 3)
beta_shape2_one_sample(x, 1, "greater")
```

---

beta_shape2_one_way *Test the equality of shape 2 parameters of beta distributions.*

Description

Test the equality of shape 2 parameters of beta distributions.

Usage

```
beta_shape2_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All shape2s are equal. (shape2_1 = shape2_2 ... shape2_k).
- Alternative: At least one shape2 is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rbeta(150, 2, 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
beta_shape2_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rbeta(50, 2, 1), rbeta(50, 2, 2), rbeta(50, 2, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
beta_shape2_one_way(x, fctr, .95)
```

---

binomial_p_one_sample *Test the p parameter of a binomial distribution.*

Description

Test the p parameter of a binomial distribution.

Usage

```
binomial_p_one_sample(x, n, p, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	Number of successes.
n	Number of trials.
p	Hypothesized probability of success.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true. 52 successes. 100 trials
binomial_p_one_sample(52, 100, .50, "two.sided")

# Null is false. 75 successes. 100 trials
binomial_p_one_sample(75, 100, .50, "two.sided")
```

---

binomial_p_one_way *Test the equality of p parameters of binomial distributions.*

Description

Test the equality of p parameters of binomial distributions.

Usage

```
binomial_p_one_way(x, n, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector indicating number of successes per group.
n	a numeric vector indicating number of attempts per group.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true.
set.seed(1)
x <- rbinom(3, 50, .5)
n <- rep(50, length(x))
fctr <- factor(1:length(x))
binomial_p_one_way(x, n, fctr, .95)

# Null is false
set.seed(1)
x <- rbinom(3, 50, c(.25, .50, .75))
n <- rep(50, length(x))
fctr <- factor(1:length(x))
binomial_p_one_way(x, n, fctr, .95)
```

---

cauchy_location_one_sample

Test the location parameter of a cauchy distribution.

Description

Test the location parameter of a cauchy distribution.

Usage

```
cauchy_location_one_sample(
  x,
  location,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
location	a number indicating the tested value of the location parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rcauchy(n = 100, location = 1, scale = 2)
cauchy_location_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rcauchy(n = 100, location = 3, scale = 2)
cauchy_location_one_sample(x, 1, "greater")
```

---

cauchy_location_one_way

Test the equality of location parameters of cauchy distributions.

Description

Test the equality of location parameters of cauchy distributions.

Usage

```
cauchy_location_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- All locations are equal. (location_1 = location_2 ... location_k).
- Alternative: At least one location is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rcauchy(n = 150, location = 1, scale = 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
cauchy_location_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rcauchy(50, 1, 2), rcauchy(50, 2, 2), rcauchy(50, 3, 2))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
cauchy_location_one_way(x, fctr, .95)
```

---

cauchy_scale_one_sample

Test the scale parameter of a cauchy distribution.

Description

Test the scale parameter of a cauchy distribution.

Usage

```
cauchy_scale_one_sample(x, scale, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
scale	a number indicating the tested value of the scale parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rcauchy(n = 100, location = 1, scale = 2)
cauchy_scale_one_sample(x, 2, "two.sided")

# Null is false
set.seed(1)
x <- rcauchy(n = 100, location = 3, scale = 2)
cauchy_scale_one_sample(x, 1, "greater")
```

---

cauchy_scale_one_way *Test the equality of scale parameters of cauchy distributions.*

Description

Test the equality of scale parameters of cauchy distributions.

Usage

```
cauchy_scale_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All scales are equal. (scale_1 = scale_2 ... scale_k).
- Alternative: At least one scale is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rcauchy(n = 150, 1, 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
cauchy_scale_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rcauchy(50, 2, 1), rcauchy(50, 2, 2), rcauchy(50, 2, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
cauchy_scale_one_way(x, fctr, .95)
```

---

empirical_mu_one_sample

Test the mean parameter of an unknown distribution.

Description

Test the mean parameter of an unknown distribution.

Usage

```
empirical_mu_one_sample(x, mu, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector.
mu	a number indicating the tested value of mu.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Owen. Empirical Likelihood. Chapman & Hall/CRC.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(25, 0, 1)
empirical_mu_one_sample(x, 0, "two.sided")

# Null is false
set.seed(1)
x <- rnorm(25, 2, 1)
empirical_mu_one_sample(x, 1, "greater")
```

---

empirical_mu_one_way *Test the equality of means of an unknown distribution.*

Description

Test the equality of means of an unknown distribution.

Usage

```
empirical_mu_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All mus are equal. (mu1 = mu2 ... muk).
- Alternative: At least one mu is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Owen. Empirical Likelihood. Chapman & Hall/CRC.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(75, 1, 1)
fctr <- c(rep(1, 25), rep(2, 25), rep(3, 25))
fctr <- factor(fctr, levels = c("1", "2", "3"))
empirical_mu_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rnorm(25, 1, 1), rnorm(25, 2, 1), rnorm(25, 3, 1))
fctr <- c(rep(1, 25), rep(2, 25), rep(3, 25))
fctr <- factor(fctr, levels = c("1", "2", "3"))
empirical_mu_one_way(x, fctr, .95)
```

---

empirical_quantile_one_sample

Test a quantile of an unknown distribution.

Description

Test a quantile of an unknown distribution.

Usage

```
empirical_quantile_one_sample(
  x,
  Q,
  value,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector.
Q	The quantile. A single numeric number. (.50 is median.)
value	A single numeric value that is the hypothesized Q quantile.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Details

For confidence intervals, an endpoint may be outside the observed range of x. In this case, NA is returned. Reducing confidence or collecting more data will make the CI computable.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Owen. Empirical Likelihood. Chapman & Hall/CRC.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(25, 0, 1)
empirical_quantile_one_sample(x, .5, 0, "two.sided")

# Null is false
set.seed(1)
x <- rnorm(25, 2, 1)
empirical_quantile_one_sample(x, .5, 1, "greater")
```

`empirical_quantile_one_way` *Test the equality of a quantile from an unknown distribution.*

Description

Test the equality of a quantile from an unknown distribution.

Usage

```
empirical_quantile_one_way(x, Q, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector.
`Q`	The quantile. A single numeric number. (.50 is median.)
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: Quantiles are equal. (Q1 = Q2 ... Qk).
- Alternative: At least one quantile is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Owen. Empirical Likelihood. Chapman & Hall/CRC.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(75, 1, 1)
fctr <- c(rep(1, 25), rep(2, 25), rep(3, 25))
fctr <- factor(fctr, levels = c("1", "2", "3"))
empirical_quantile_one_way(x, .50, fctr, .95)

# Null is false
set.seed(1)
```

```
x <- c(rnorm(25, 1, 1), rnorm(25, 2, 1), rnorm(25, 3, 1))
fctr <- c(rep(1, 25), rep(2, 25), rep(3, 25))
fctr <- factor(fctr, levels = c("1", "2", "3"))
empirical_quantile_one_way(x, .50, fctr, .95)
```

`exponential_rate_one_sample` *Test the rate parameter of a exponential distribution.*

Description

Test the rate parameter of a exponential distribution.

Usage

```
exponential_rate_one_sample(
  x,
  rate,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

`x`	a numeric vector of data.
`rate`	a number indicating the tested value of rate.
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
`conf.level`	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rexp(100, 1)
exponential_rate_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rexp(100, 3)
exponential_rate_one_sample(x, 1, "greater")
```

`exponential_rate_one_way`

Test the equality of rate parameters of exponential distributions.

Description

Test the equality of rate parameters of exponential distributions.

Usage

```
exponential_rate_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All lambdas are equal. (lambda_1 = lambda_2 ... lambda_k).
- Alternative: At least one lambda is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rexp(150, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
exponential_rate_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rexp(50, 1), rexp(50, 2), rexp(50, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
exponential_rate_one_way(x, fctr, .95)
```

---

gamma_rate_one_sample *Test the rate parameter of a gamma distribution.*

Description

Test the rate parameter of a gamma distribution.

Usage

```
gamma_rate_one_sample(x, rate, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
rate	a number indicating the tested value of the rate parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(100, shape = 1, rate = 1)
gamma_rate_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rgamma(100, shape = 1, rate = 2)
gamma_rate_one_sample(x, 1, "greater")
```

`gamma_rate_one_way` *Test the equality of rate parameters of gamma distributions.*

Description

Test the equality of rate parameters of gamma distributions.

Usage

```
gamma_rate_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All rates are equal. (rate_1 = rate_2 ... rate_k).
- Alternative: At least one rate is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(150, 1, 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_rate_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rgamma(50, 2, 1), rgamma(50, 2, 2), rgamma(50, 2, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_rate_one_way(x, fctr, .95)
```

`gamma_scale_one_sample` *Test the scale parameter of a gamma distribution.*

Description

Test the scale parameter of a gamma distribution.

Usage

```
gamma_scale_one_sample(x, scale, alternative = "two.sided", conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`scale`	a number indicating the tested value of the scale parameter.
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
`conf.level`	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(100, shape = 1, scale = 2)
gamma_scale_one_sample(x, 2, "two.sided")

# Null is false
set.seed(1)
x <- rgamma(100, shape = 1, scale = 2)
gamma_scale_one_sample(x, 1, "greater")
```

`gamma_scale_one_way` *Test the equality of scale parameters of gamma distributions.*

Description

Test the equality of scale parameters of gamma distributions.

Usage

```
gamma_scale_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: Null: All scales are equal. (scale_1 = scale_2 ... scale_k).
- Alternative: At least one scale is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(150, 1, scale = 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_scale_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rgamma(50, 2, scale = 1), rgamma(50, 2, scale = 2), rgamma(50, 2, scale = 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_scale_one_way(x, fctr, .95)
```

---

gamma_shape_one_sample

Test the shape parameter of a gamma distribution.

Description

Test the shape parameter of a gamma distribution.

Usage

```
gamma_shape_one_sample(x, shape, alternative = "two.sided", conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
shape	a number indicating the tested value of the shape parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(100, shape = 1, scale = 2)
gamma_shape_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rgamma(100, shape = 3, scale = 2)
gamma_shape_one_sample(x, 1, "greater")
```

---

gamma_shape_one_way *Test the equality of shape parameters of gamma distributions.*

Description

Test the equality of shape parameters of gamma distributions.

Usage

```
gamma_shape_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All shapes are equal. (shape_1 = shape_2 ... shape_k).
- Alternative: At least one shape is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rgamma(150, 2, 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_shape_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rgamma(50, 1, 2), rgamma(50, 2, 2), rgamma(50, 3, 2))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gamma_shape_one_way(x, fctr, .95)
```

`gaussian_mu_one_sample`

Test the mean of a gaussian distribution.

Description

Test the mean of a gaussian distribution.

Usage

```
gaussian_mu_one_sample(x, mu, alternative = "two.sided", conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`mu`	a number indicating the tested value of mu.
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
`conf.level`	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(100, 0, 1)
gaussian_mu_one_sample(x, 0, "two.sided")

# Null is false
set.seed(1)
x <- rnorm(100, 3, 1)
gaussian_mu_one_sample(x, 0, "greater")
```

---

gaussian_mu_one_way *Test the equality of means of gaussian distributions.*

Description

Test the equality of means of gaussian distributions.

Usage

```
gaussian_mu_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All mus are equal. (mu1 = mu2 ... muk).
- Alternative: At least one mu is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(150, 1, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gaussian_mu_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rnorm(50, 1, 1), rnorm(50, 2, 1), rnorm(50, 3, 1))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gaussian_mu_one_way(x, fctr, .95)
```

---

gaussian_variance_one_sample

Test the variance of a gaussian distribution.

Description

Test the variance of a gaussian distribution.

Usage

```
gaussian_variance_one_sample(
  x,
  sigma.squared,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
sigma.squared	a number indicating the tested value of sigma squared.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(100, 0, 1)
gaussian_variance_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rnorm(100, 0, 2)
gaussian_variance_one_sample(x, 1, "greater")
```

---

gaussian_variance_one_way

Test the equality of variance parameters of gaussian distributions.

Description

Test the equality of variance parameters of gaussian distributions.

Usage

```
gaussian_variance_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All variances are equal. (o^2_1 = o^2_2 ... o^2_k).
- Alternative: At least one variance is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rnorm(150, 1, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gaussian_variance_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rnorm(50, 1, 1), rnorm(50, 1, 2), rnorm(50, 1, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
gaussian_variance_one_way(x, fctr, .95)
```

---

inverse_gaussian_dispersion_one_sample

Test the dispersion parameter of an inverse gaussian distribution.

Description

Test the dispersion parameter of an inverse gaussian distribution.

Usage

```
inverse_gaussian_dispersion_one_sample(
  x,
  dispersion,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
dispersion	a number indicating the tested value of the dispersion parameter.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 100, mean = 1, dispersion = 2)
inverse_gaussian_dispersion_one_sample(x, 2, "two.sided")

# Null is false
set.seed(1)
x <- rinvgauss(n = 100, mean = 1, dispersion = 2)
inverse_gaussian_dispersion_one_sample(x, 1, "greater")
```

`inverse_gaussian_dispersion_one_way` *Test the equality of dispersion parameters of inverse gaussian distributions.*

Description

Test the equality of dispersion parameters of inverse gaussian distributions.

Usage

```
inverse_gaussian_dispersion_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: Null: All dispersion parameters are equal. (dispersion_1 = dispersion_2 ... dispersion_k).
- Alternative: At least one dispersion is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 150, mean = 1, dispersion = 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_dispersion_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(
  rinvgauss(n = 50, mean = 1, dispersion = 1),
  rinvgauss(n = 50, mean = 1, dispersion = 3),
  rinvgauss(n = 50, mean = 1, dispersion = 4)
)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_dispersion_one_way(x, fctr, .95)
```

---

inverse_gaussian_mu_one_sample

Test the mean of an inverse gaussian distribution.

Description

Test the mean of an inverse gaussian distribution.

Usage

```
inverse_gaussian_mu_one_sample(
  x,
  mu,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
mu	a number indicating the tested value of mu.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 100, mean = 1, shape = 2)
inverse_gaussian_mu_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rinvgauss(n = 100, mean = 3, shape = 2)
inverse_gaussian_mu_one_sample(x, 1, "greater")
```

`inverse_gaussian_mu_one_way` *Test the equality of means of inverse gaussian distributions.*

Description

Test the equality of means of inverse gaussian distributions.

Usage

```
inverse_gaussian_mu_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All mus are equal. (mu1 = mu2 ... muk).
- Alternative: At least one mu is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 150, mean = 1, shape = 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_mu_one_way(x, fctr, .95)

# Null is false
```

```
set.seed(1)
x <- c(
  rinvgauss(n = 50, mean = 1, shape = 2),
  rinvgauss(n = 50, mean = 2, shape = 2),
  rinvgauss(n = 50, mean = 3, shape = 2)
)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_mu_one_way(x, fctr, .95)
```

`inverse_gaussian_shape_one_sample` *Test the shape parameter of an inverse gaussian distribution.*

Description

Test the shape parameter of an inverse gaussian distribution.

Usage

```
inverse_gaussian_shape_one_sample(
  x,
  shape,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

`x`	a numeric vector of data.
`shape`	a number indicating the tested value of the shape parameter.
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
`conf.level`	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 100, mean = 1, shape = 2)
inverse_gaussian_shape_one_sample(x, 2, "two.sided")

# Null is false
set.seed(1)
x <- rinvgauss(n = 100, mean = 1, shape = 2)
inverse_gaussian_shape_one_sample(x, 1, "greater")
```

---

inverse_gaussian_shape_one_way

Test the equality of shape parameters of inverse gaussian distributions.

Description

Test the equality of shape parameters of inverse gaussian distributions.

Usage

```
inverse_gaussian_shape_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: Null: All shapes are equal. (shape_1 = shape_2 ... shape_k).
- Alternative: At least one shape is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)
library(statmod)

# Null is true
set.seed(1)
x <- rinvgauss(n = 150, mean = 1, shape = 2)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_shape_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(
  rinvgauss(n = 50, mean = 1, shape = 1),
  rinvgauss(n = 50, mean = 1, shape = 3),
  rinvgauss(n = 50, mean = 1, shape = 4)
)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
inverse_gaussian_shape_one_way(x, fctr, .95)
```

`log_normal_mu_one_sample`

Test the mean of a log normal distribution.

Description

Test the mean of a log normal distribution.

Usage

```
log_normal_mu_one_sample(x, mu, alternative = "two.sided", conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`mu`	a number indicating the tested value of mu.
`alternative`	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
`conf.level`	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rlnorm(100, 0, 1)
log_normal_mu_one_sample(x, 0, "two.sided")

# Null is false
set.seed(1)
x <- rlnorm(100, 3, 1)
log_normal_mu_one_sample(x, 0, "greater")
```

---

log_normal_mu_one_way *Test the equality of means of log normal distributions.*

Description

Test the equality of means of log normal distributions.

Usage

```
log_normal_mu_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All mus are equal. (mu1 = mu2 ... muk).
- Alternative: At least one mu is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rlnorm(150, 1, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
log_normal_mu_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rlnorm(50, 1, 1), rlnorm(50, 2, 1), rlnorm(50, 3, 1))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
log_normal_mu_one_way(x, fctr, .95)
```

---

log_normal_variance_one_sample

Test the variance of a log normal distribution.

Description

Test the variance of a log normal distribution.

Usage

```
log_normal_variance_one_sample(
  x,
  sigma.squared,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
sigma.squared	a number indicating the tested value of sigma squared.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rlnorm(100, 0, 1)
log_normal_variance_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rlnorm(100, 0, 2)
log_normal_variance_one_sample(x, 1, "greater")
```

---

log_normal_variance_one_way

Test the equality of variance parameters of log normal distributions.

Description

Test the equality of variance parameters of log normal distributions.

Usage

```
log_normal_variance_one_way(x, fctr, conf.level = 0.95)
```

Arguments

x	a numeric vector of data.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- Null: All variances are equal. (o^2_1 = o^2_2 ... o^2_k).
- Alternative: At least one variance is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rlnorm(150, 1, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
log_normal_variance_one_way(x, fctr, .95)

# Null is false
set.seed(1)
x <- c(rlnorm(50, 1, 1), rlnorm(50, 1, 2), rlnorm(50, 1, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
log_normal_variance_one_way(x, fctr, .95)
```

---

negative_binomial_p_one_sample

Test the p parameter of a negative binomial distribution.

Description

Test the p parameter of a negative binomial distribution.

Usage

```
negative_binomial_p_one_sample(
  num_failures,
  num_successes,
  p,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

num_failures	Number of failures.
num_successes	Number of successes.
p	Hypothesized probability of success.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true. 48 failures before 52 successes.
negative_binomial_p_one_sample(48, 52, .50, "two.sided")

# Null is false. 25 failures before 75 successes.
negative_binomial_p_one_sample(25, 75, .50, "two.sided")
```

---

negative_binomial_p_one_way

Test the equality of p parameters of negative binomial distributions.

Description

Test the equality of p parameters of negative binomial distributions.

Usage

```
negative_binomial_p_one_way(
  num_failures,
  num_successes,
  fctr,
  conf.level = 0.95
)
```

Arguments

num_failures	a numeric vector indicating number of failures per group.
num_successes	a numeric vector indicating number of successes per group.
fctr	a factor vector indicating groups.
conf.level	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true.
set.seed(1)
num_failures <- rnbinom(3, 50, .5)
num_successes <- rep(50, length(num_failures))
fctr <- factor(1:length(num_failures))
negative_binomial_p_one_way(num_failures, num_successes, fctr, .95)


# Null is false
set.seed(1)
num_failures <- rnbinom(3, 50, c(.25, .50, .75))
num_successes <- rep(50, length(num_failures))
fctr <- factor(1:length(num_failures))
negative_binomial_p_one_way(num_failures, num_successes, fctr, .95)
```

---

poisson_lambda_one_sample

Test the lambda parameter of a poisson distribution.

Description

Test the lambda parameter of a poisson distribution.

Usage

```
poisson_lambda_one_sample(
  x,
  lambda,
  alternative = "two.sided",
  conf.level = 0.95
)
```

Arguments

x	a numeric vector of data.
lambda	a number indicating the tested value of lambda
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less".
conf.level	confidence level of the likelihood interval.

Value

An S3 class containing the test statistic, p value, likelihood based confidence interval, and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rpois(100, 1)
poisson_lambda_one_sample(x, 1, "two.sided")

# Null is false
set.seed(1)
x <- rpois(100, 2)
poisson_lambda_one_sample(x, 1, "greater")
```

`poisson_lambda_one_way` *Test the equality of lambda parameters of poisson distributions.*

Description

Test the equality of lambda parameters of poisson distributions.

Usage

```
poisson_lambda_one_way(x, fctr, conf.level = 0.95)
```

Arguments

`x`	a numeric vector of data.
`fctr`	a factor vector indicating groups.
`conf.level`	overall confidence level of the likelihood intervals. Uses Bonferroni correction.

Details

- All lambdas are equal. (lambda_1 = lambda_2 ... lambda_k).
- Alternative: At least one lambda is not equal.

Value

An S3 class containing the test statistic, p value, list of likelihood based confidence intervals, overall confidence level, individual confidence level of each interval and alternative hypothesis.

Source

- https://en.wikipedia.org/wiki/Likelihood-ratio_test
- Yudi Pawitan. In All Likelihood. Oxford University Press.
- Hodd, McKean, and Craig. Introduction to Mathematical Statistics. Pearson.

Examples

```
library(LRTesteR)

# Null is true
set.seed(1)
x <- rpois(150, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
poisson_lambda_one_way(x, fctr, .95)

# Null is false
set.seed(1)
```

```
x <- c(rpois(50, 1), rpois(50, 2), rpois(50, 3))
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
poisson_lambda_one_way(x, fctr, .95)
```

`print.lrtest` *Print results of tests.*

Description

Print results of tests.

Usage

```
## S3 method for class 'lrtest'
print(x, ...)
```

Arguments

`x`	a test from LRTesteR.
`...`	arguments passed to other methods.

Examples

```
library(LRTesteR)

set.seed(1)
x <- rnorm(100, 0, 1)
test <- gaussian_mu_one_sample(x, 0, "two.sided")
print(test)

set.seed(1)
x <- rnorm(150, 1, 1)
fctr <- c(rep(1, 50), rep(2, 50), rep(3, 50))
fctr <- factor(fctr, levels = c("1", "2", "3"))
test <- gaussian_mu_one_way(x, fctr, .95)
print(test)
```

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