Package 'jackknifeR'

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Type Package

Title Delete-d Jackknife for Point and Interval Estimation

Version 2.0.0

Description Implements delete-d jackknife resampling for robust statistical estimation. The package provides both weighted (HC3-adjusted) and unweighted versions of jackknife estimation, with parallel computation support. Suitable for biomedical research and other fields requiring robust variance estimation.

License GPL (>= 3)

BugReports https://github.com/MohanasundaramS/jackknifeR/issues

Imports doFuture, foreach, future, future.apply, stats, utils

Suggests spelling

Encoding UTF-8

Language en-US

RoxygenNote 7.3.2

NeedsCompilation no

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Repository CRAN

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Contents

`jackknife` *Delete-d Jackknife for Estimates*

Description

This function creates jackknife samples from the data by sequentially removing *d* observations from the data, and calculates the estimates by the specified function and its bias, standard error, and confidence intervals.

Usage

```
jackknife(
  statistic,
  d = 1,
  data,
  conf = 0.95,
  numCores = detectCores(),
  weight = FALSE,
  hat_values = NULL,
  residuals = NULL,
  X = NULL,
  p = NULL
)
```

Arguments

`statistic`	a function returning a vector of estimates to be passed to jackknife
`d`	Number of observations to be deleted from data to make jackknife samples. The default is 1 (for delete-1 jackknife).
`data`	Data frame with dependent and independent independent variables specified in the formula
`conf`	Confidence level, a positive number < 1. The default is 0.95.
`numCores`	Number of processors to be used
`weight`	Logical, TRUE for weighted jackknife standard error of regression estimates. Default weight = FALSE
`hat_values`	Vector of hat values (leverages) from the model. Required if 'weight = TRUE
`residuals`	Vector of residuals from the model. Required if `weight = TRUE`.
`X`	Model matrix. Required if `weight = TRUE`.
`p`	Number of predictors in the model. Required if `weight = TRUE`.

Value

A list containing a summary data frame of jackknife estimates with bias, standard error. t-statistics, and confidence intervals, estimate for the original sample and a data frame with estimates for jackknife samples.

References

Quenouille, M. H. (1956). Notes on Bias in Estimation. *Biometrika*, *43*(3/4), 353-360. doi:10.2307/2332914

Tukey, J. W. (1958). Bias and Confidence in Not-quite Large Samples. *Annals of Mathematical Statistics*, *29*(2), 614-623. doi:10.1214/aoms/1177706647

Shi, X. (1988). A note on the delete-d jackknife variance estimators. *Statistics & Probability Letters*, *6*(5), 341-347. doi:10.1016/01677152(88)900119

See Also

`jackknife.lm()` which is used for jackknifing in linear regression.

Examples

```
library(future)
plan(multisession)  # Initialize once per session
# For linear regression coefficients
jk_results <- jackknife(
statistic = function(sub_data) coef(lm(mpg ~ wt + hp, data = sub_data)),
d = 2,
data = mtcars,
conf = 0.95, numCores = 2)
print(jk_results)
```

`jackknife.cor` *Delete-d Jackknife Estimate for Correlation between Two Variables*

Description

This function creates jackknife samples from the data by sequentially removing *d* observations, calculates the correlation, and estimates bias, standard error, and confidence intervals.

Usage

```
jackknife.cor(data, d = 1, conf = 0.95, numCores = parallel::detectCores())
```

Arguments

`data`	A data frame with two numeric columns.
`d`	Number of observations to delete (default: 1).
`conf`	Confidence level (default: 0.95).
`numCores`	Number of processors (default: `detectCores()`).

Value

A list of class "jackknife" containing estimates, bias, standard error, and confidence intervals.

References

Quenouille (1956), Tukey (1958), Shi (1988).

See Also

cor(), jackknife()

Examples

```
j.cor <- jackknife.cor(cars, d = 2, numCores = 2)
summary(j.cor)
```

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jackknife.lm *Delete-d Jackknife Estimate for Linear Regression*

Description

This function creates jackknife samples from the data by sequentially removing *d* observations from the data, fits models linear regression model using the jackknife samples as specified in the formula and estimates the jackknife coefficients bias standard error, standard error and confidence intervals.

Usage

```
jackknife.lm(formula, d = 1, data, conf = 0.95, numCores = detectCores())
```

Arguments

formula	Simple or multiple linear regression formula with dependent and independent variables
d	Number of observations to be deleted from data to make jackknife samples. The default is 1 (for delete-1 jackknife).
data	Data frame with dependent and independent independent variables specified in the formula
conf	Confidence level, a positive number < 1. The default is 0.95.
numCores	Number of processors to be used

Value

A list containing a summary data frame of jackknife estimates with bias, standard error. t-statistics, and confidence intervals, linear regression model of original data and a data frame with coefficient estimates of jackknife samples.

References

Quenouille, M. H. (1956). Notes on Bias in Estimation. *Biometrika*, *43*(3/4), 353-360. doi:10.2307/2332914

Tukey, J. W. (1958). Bias and Confidence in Not-quite Large Samples. *Annals of Mathematical Statistics*, *29*(2), 614-623. doi:10.1214/aoms/1177706647

Shi, X. (1988). A note on the delete-d jackknife variance estimators. *Statistics & Probability Letters*, *6*(5), 341-347. doi:10.1016/01677152(88)900119

See Also

`lm()` which is used for linear regression.

Examples

```
## library(jackknifeR)
jk <- jackknife.lm(mpg ~ wt + hp, d = 2, data = mtcars, numCores = 2)
summary(jk)
```

`jackknife.lm.weighted` *Delete-d Jackknife Estimate for Linear Regression*

Description

This function creates jackknife samples from the data by sequentially removing *d* observations from the data, fits models linear regression model using the jackknife samples as specified in the formula and estimates the jackknife coefficients bias standard error, standard error and confidence intervals.

Usage

```
jackknife.lm.weighted(
  formula,
  d = 1,
  data,
  conf = 0.95,
  numCores = detectCores()
)
```

Arguments

`formula`	Simple or multiple linear regression formula with dependent and independent variables
`d`	Number of observations to be deleted from data to make jackknife samples. The default is 1 (for delete-1 jackknife).
`data`	Data frame with dependent and independent independent variables specified in the formula
`conf`	Confidence level, a positive number < 1. The default is 0.95.
`numCores`	Number of processors to be used

Value

A list containing a summary data frame of jackknife estimates with bias, standard error. t-statistics, and confidence intervals, linear regression model of original data and a data frame with coefficient estimates of jackknife samples.

References

Quenouille, M. H. (1956). Notes on Bias in Estimation. *Biometrika*, *43*(3/4), 353-360. doi:10.2307/2332914

Tukey, J. W. (1958). Bias and Confidence in Not-quite Large Samples. *Annals of Mathematical Statistics*, *29*(2), 614-623. doi:10.1214/aoms/1177706647

Shi, X. (1988). A note on the delete-d jackknife variance estimators. *Statistics & Probability Letters*, *6*(5), 341-347. doi:10.1016/01677152(88)900119

See Also

`lm()` which is used for linear regression.

Examples

```
## library(jackknifeR)
jk_weighted <- jackknife.lm.weighted(mpg ~ wt + hp, d = 2, data = mtcars, numCores = 2)
summary(jk_weighted)
```

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