Package ‘betaMC’

December 23, 2022

Title Monte Carlo Confidence Intervals for Standardized Regression Coefficients

Version 1.0.0

Description Generates Monte Carlo confidence intervals for standardized regression coefficients for models fitted by lm().
'betaMC' combines ideas from Monte Carlo confidence intervals for the indirect effect (Preacher and Selig, 2012 <doi:10.1080/19312458.2012.679848>)
and the sampling covariance matrix of regression coefficients (Dudgeon, 2017 <doi:10.1007/s11336-017-9563-z>)
to generate confidence intervals for standardized regression coefficients.

URL `https://github.com/jeksterslab/betaMC`,
`https://jeksterslab.github.io/betaMC/`

BugReports `https://github.com/jeksterslab/betaMC/issues`

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Roxygen list(markdown = TRUE)

Depends R (>= 3.5.0)

Imports stats, methods

Suggests knitr, rmarkdown, testthat

RoxygenNote 7.2.3

NeedsCompilation no

Author Ivan Jacob Agaloos Pesigan [aut, cre, cph] (<`https://orcid.org/0000-0003-4818-8420`>)

Maintainer Ivan Jacob Agaloos Pesigan <`r.jeksterslab@gmail.com`>

R topics documented:

`BetaMC` *Estimate Standardized Regression Coefficients and Generate Sampling Distributions Using the Monte Carlo Method*

Description

Estimate Standardized Regression Coefficients and Generate Sampling Distributions Using the Monte Carlo Method

Usage

```
BetaMC(
  object,
  R = 20000L,
  type = "hc3",
  g1 = 1,
  g2 = 1.5,
  k = 0.7,
  decomposition = "eigen",
  pd = TRUE,
  tol = 1e-06
)
```

Arguments

`object`	Object of class `lm`.
`R`	Positive integer. Number of Monte Carlo replications.
`type`	Character string. Correction type. Possible values are `"adf"`, `"hc0"`, `"hc1"`, `"hc2"`, `"hc3"`, `"hc4"`, `"hc4m"`, `"hc5"`, and `"mvn"`.
`g1`	Numeric. `g1` value for `type = "hc4m"` or `type = "hc5"`.
`g2`	Numeric. `g2` value for `type = "hc4m"`.
`k`	Numeric. Constant for `type = "hc5"`
`decomposition`	Character string. Matrix decomposition of the sampling variance-covariance matrix for the data generation. If `decomposition = "chol"`, use Cholesky decomposition. If `decomposition = "eigen"`, use eigenvalue decomposition. If `decomposition = "svd"`, use singular value decomposition.
`pd`	Logical. If `pd = TRUE`, check if the sampling variance-covariance matrix is positive definite using `tol`.
`tol`	Numeric. Tolerance used for `pd`.

Value

Returns an object of class `betamc` which is a list with the following elements:

call Function call.

lm Object of class `lm`.

type Standard error type.

beta Vector of standardized slopes.

vcov Sampling covariance matrix of the standardized slopes.

thetahatstar Sampling distribution of estimates of standardized slopes.

n Sample size.

p Number of regressors.

df $n - p - 1$ degrees of freedom.

Author(s)

Ivan Jacob Agaloos Pesigan

References

Dudgeon, P. (2017). Some improvements in confidence intervals for standardized regression coefficients. *Psychometrika*, *82*(4), 928–951. doi:10.1007/s113360179563z

Preacher, K. J., & Selig, J. P. (2012). Advantages of Monte Carlo confidence intervals for indirect effects. *Communication Methods and Measures*, *6*(2), 77-98. doi:10.1080/19312458.2012.679848

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
# Methods -------------------------------------------------------
print(std)
summary(std)
coef(std)
vcov(std)
confint(std, level = 0.95)
```

`coef.betamc` *Standardized Regression Slopes*

Description

Standardized Regression Slopes

Usage

```
## S3 method for class 'betamc'
coef(object, ...)
```

Arguments

`object`	Object of class `betamc`.
`...`	additional arguments.

Value

Returns a vector of standardized regression slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
coef(std)
```

`confint.betamc` *Confidence Intervals for Standardized Regression Slopes*

Description

Confidence Intervals for Standardized Regression Slopes

Usage

```
## S3 method for class 'betamc'
confint(object, parm = NULL, level = 0.95, ...)
```

Arguments

`object`	Object of class `betamc`.
`parm`	a specification of which parameters are to be given confidence intervals, either a vector of numbers or a vector of names. If missing, all parameters are considered.
`level`	the confidence level required.
`...`	additional arguments.

Value

Returns a matrix of confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
confint(std, level = 0.95)
```

---

nas1982 *1982 National Academy of Sciences Doctoral Programs Data*

Description

1982 National Academy of Sciences Doctoral Programs Data

Usage

```
nas1982
```

Format

Ratings of 46 doctoral programs in psychology in the USA with the following variables:

QUALITY Program quality ratings.

NFACUL Number of faculty members in the program.

NGRADS Number of program graduates.

PCTSUPP Percentage of program graduates who received support.

PCTGRT Percent of faculty members holding research grants.

NARTIC Number of published articles attributed to program faculty member.

PCTPUB Percent of faculty with one or more published article.

References

National Research Council. (1982). *An assessment of research-doctorate programs in the United States: Social and behavioral sciences*. doi:10.17226/9781. Reproduced with permission from the National Academy of Sciences, Courtesy of the National Academies Press, Washington, D.C.

print.betamc *Print Method for an Object of Class* `betamc`

Description

Print Method for an Object of Class `betamc`

Usage

```
## S3 method for class 'betamc'
print(x, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

`x`	Object of Class `betamc`.
`alpha`	Significance level.
`digits`	Digits to print.
`...`	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
print(std)
```

summary.betamc *Summary Method for an Object of Class* `betamc`

Description

Summary Method for an Object of Class `betamc`

Usage

```
## S3 method for class 'betamc'
summary(object, alpha = c(0.05, 0.01, 0.001), digits = 4, ...)
```

Arguments

`object`	Object of class `betamc`.
`alpha`	Significance level.
`digits`	Digits to print.
`...`	additional arguments.

Value

Returns a matrix of standardized regression slopes, standard errors, test statistics, p-values, and confidence intervals.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
summary(std)
```

`vcov.betamc` *Sampling Covariance Matrix of the Standardized Regression Slopes*

Description

Sampling Covariance Matrix of the Standardized Regression Slopes

Usage

```
## S3 method for class 'betamc'
vcov(object, ...)
```

Arguments

`object`	Object of class `betamc`.
`...`	additional arguments.

Value

Returns a matrix of the variance-covariance matrix of standardized slopes.

Author(s)

Ivan Jacob Agaloos Pesigan

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
std <- BetaMC(object)
vcov(std)
```

Index