

Package ‘betaMC’

December 28, 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](https://doi.org/10.1080/19312458.2012.679848)>) and the sampling covariance matrix of regression coefficients (Dudgeon, 2017 <[doi:10.1007/s11336-017-9563-z](https://doi.org/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>

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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

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BetaMC	<i>Estimate Standardized Regression Coefficients and Generate Sampling Distributions Using the Monte Carlo Method</i>
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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 <code>lm</code> .
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](https://doi.org/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](https://doi.org/10.1080/19312458.2012.679848)

Examples

```
object <- lm(QUALITY ~ NARTIC + PCTGRT + PCTSUPP, data = nas1982)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
# Methods -----
print(out)
summary(out)
coef(out)
vcov(out)
confint(out, 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)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
coef(out)
```

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)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
confint(out, 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	<i>Print Method for an Object of Class betamc</i>
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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)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
print(out)
```

summary.betamc	<i>Summary Method for an Object of Class betamc</i>
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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)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
summary(out)
```

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)
out <- BetaMC(object, R = 100)
# use a large R, for example, R = 20000 for actual research
vcov(out)
```


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