

Package ‘RsqMed’

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Title Total Mediation Effect Size Measure (R-Squared Measure) under Moderate or High-Dimensional Mediator Settings

Version 0.1.7.1

Description

An implementation of calculating the R-squared measure as a total mediation effect size measure and its confidence interval for moderate- or high-dimensional mediator model. It gives an option to filter out non-mediators using variable selection method. This R package is directly related to the paper “Estimation of mediation effect for high-dimensional omics mediators with application to the Framingham Heart Study” with <doi:10.1101/774877>.

Depends R (>= 3.5.0)

Imports SIS (>= 0.8), GMMAT (>= 1.1.0)

Suggests MASS, stats, knitr

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

NeedsCompilation no

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CI.Rsq.measure	<i>Functions to generate the confidence interval of the Rsq measure using nonparametric bootstrap.</i>
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Description

Functions to generate the confidence interval of the Rsq measure using nonparametric bootstrap.

Usage

```
CI.Rsq.measure(p = 1/2, outcome, med, covar, indp, method = c("iSIS",
  "All"), B = 200, iter.max = 10, nsis = NULL, init.cutoff = 0.1,
  screening = F)
```

Arguments

p	Proportion of the training dataset for selecting mediators regarding to the whole dataset, default is set as 1/2
outcome	Vector of outcome type of interest; Only Gaussian distributed outcome is accepted.
med	Matrix of putative mediators
covar	Covariate matrix
indp	Vector of the independent variable of interest, e.g. environmental exposure
method	Method used to screen out non-mediators. When no variable selection is required, method='ALL'; otherwise, iterative sure independence screening (SIS) is used for variable selection, i.e., method='iSIS'.
B	Number of bootstrap samples, default is 100
iter.max	Maximum number of iteration used in iSIS, default=10 (details see the SIS package)
nsis	Number of predictors recruited by iSIS
init.cutoff	The percentage of mediators remaining after the screening step.
screening	T: filtering mediators based on the strength of indp and mediators as a preprocessing step; F: all putative mediators are included, default=F.

Value

CI: The 95 percent confidence intervals of Rsq measure (Rsq.mediated), shared over simple effects (SOS), number of mediators selected (pab), variance of outcome explained by mediator (Rsq.YM), variance of outcome explained by the independent variable (Rsq.YX), and variance of outcome explained by mediator and independent variable (Rsq.YMX). The estimates for each bootstrap are also returned.

Examples

```
{
  data(example)
  attach(example)
  CI.Rsq.measure( p=1/2, outcome=Y, med=M[,1:2], covar=NULL, indp=X, method='ALL', B=1)
}
```

example

*Example dataset***Description**

Example dataset for RsqMed.

Format

Contains the following objects:

Y a vector of 100 observations, representing outcome.

X a vector of 100 observations, representing independent variable.

M a 100 * 100 matrix, representing mediators.

Cov a 100 * 2 matrix, representing covariates.

Rsq.measure

Function to calculate the Rsq function as a total mediation effect size measure (Gaussian outcome only). If method='iSIS', a two-step procedure is performed, where the first step filters the non-mediators based on part of the data and the second step calculates the point estimates for Rsq using random-effect models on the remaining data. If method='ALL', Rsq is calculated based on all subjects and variables.

Description

Function to calculate the Rsq function as a total mediation effect size measure (Gaussian outcome only). If method='iSIS', a two-step procedure is performed, where the first step filters the non-mediators based on part of the data and the second step calculates the point estimates for Rsq using random-effect models on the remaining data. If method='ALL', Rsq is calculated based on all subjects and variables.

Usage

```
Rsq.measure(p = 1/2, outcome, med, covar, indp, method = c("iSIS",
  "ALL"), iter.max = 10, nsis = NULL, init.cutoff = 0.1,
  screening = FALSE)
```

Arguments

p	Proportion of the training dataset for selecting mediators regarding the whole dataset, default is set as 1/2. If method='ALL', keep p at default.
outcome	Vector of outcome type of interest; Only Gaussian distributed outcome is accepted.
med	Matrix of putative mediators
covar	Covariate matrix
indp	Vector of the independent variable of interest, e.g. environmental variable
method	Method used to screen out non-mediators. When no variable selection is required, method='ALL'; otherwise, iterative sure independence screening (SIS) is used for variable selection, i.e., method='iSIS'. Note that when method='ALL', no screening is performed, i.e., the Rsq measure is calculated on all data and all variables included.
iter.max	Maximum number of iteration used in iSIS, default=10 (please refer the SIS package for detail explanation)
nsis	Number of variables recruited by iterative SIS
init.cutoff	The percentage of mediators remaining after the screening step.
screening	T if filtering mediators based on the strength of independent variable and mediators as a preprocessing step; F if all putative mediators are included, default=F.

Value

Output vector consist of Rsq mediated(Rsq.mediated), shared over simple effects (SOS), number of selected mediators (pab), and the Rsq that used to calculate the Rsq measure: variance of outcome explained by mediator (Rsq.YM), variance of outcome explained by the independent variable (Rsq.YX), and variance of outcome explained by mediator and independent variable (Rsq.YMX), n is the sample size based on which the random effect models are fitted.

Name of selected mediators (select)

Examples

```
{
#donttest{
data(example)
attach(example)
Rsq.measure(p=1/2, outcome=Y, med=M,covar=Cov,indp=X,method='iSIS', iter.max=1)
#}
}
```

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