Package 'THIMA'

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Type Package

Title Estimating and testing targeted mediation effect in the presence of high-dimensional mediators

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Description We propose an estimating and testing procedure for a targeted mediator of interest in the presence of a large number of mediators. Specially, we present a de-biased Lasso estimate for the targeted mediator and derive its standard error estimator, which can be used to develop a joint significance test procedure for the targeted mediation effect.

Depends R (>= 3.3), hdi, MASS

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thima Targeted High-dimensional Mediation Analysis

Description

thima is used to estimate and test the targeted mediation effect in the presence of high-dimensional mediators.

Usage

    thima(ID, X, M, Y,...)

Arguments

ID   the index of targeted mediator

X   a vector of exposure

M   a matrix of high-dimensional mediators. Rows represent samples, columns represent variables

Y   a vector of outcome

…   other arguments passed to hdi

Value

Index	ID of the targeted mediator
alpha_hat	coefficient estimate of exposure (X) $\rightarrow$ targeted mediator (M)
beta_hat	coefficient estimate of the targeted mediator (M) $\rightarrow$ outcome (Y) (adjusted for exposure and high-dimensional nuisance mediators)
Pval	P-value of the joint significance test

References

Haixiang Zhang, Jun Chen, Zhigang Li, and Lei Liu (2018). Estimating and testing targeted mediation effect in the presence of high-dimensional mediators. *Submitted*.

Examples

```
library(MASS)
library(hdi)
n <- 100 #  sample size
p <- 500 # the dimension of mediators
sigma <- matrix(0,p,p)
c <- 1 # the intercept term in Y
ck <- runif(p,1,2) # the intercept term of M
gamma <- 0.5
beta   <-   matrix(0,1,p)
alpha <-   matrix(0,1,p)
a0 <- c(0.25,0.15,0.25,0.35,0.55)
b0 <- c(0.25,0.25,0.30,0.35,0.55)
L <- length(a0)
alpha[1:L] <- a0
beta[1:L]   <- b0
ab <- alpha*beta # the mediation effect alpha*beta
M <- matrix(0,n,p) # the matrix of mediators
X <- matrix(rnorm(n, mean=0, sd=1.5),n,1)

for (i in 1:p){
  for (j in 1:p){
    sigma[i,j] <- 0.75^(abs(i-j))
    sigma[j,i] <- sigma[i,j]
  }
}

e <- mvrnorm(n, rep(0, p), sigma)

for (j in 1:p){
  M[,j] <-   alpha[j]*X + ck[j] + e[,j]
}
XM <- cbind(X,M)
B <- t(t(c(gamma, beta))) # (p+1) times 1
E <- rnorm(n,0,1)
```

```
Y <- c + XM%*%B + t(t(E))
Ind <- 5   # the index of the targeted mediator
thima.fit <- thima(ID = Ind, X, M, Y)
print(thima.fit)
```