Package ‘freebird’

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Title Estimation and Inference for High Dimensional Mediation and Surrogate Analysis

Version 1.0


Depends R (>= 3.5.0), scalreg, Rmosek, Matrix

Imports stats, MASS

License GPL (>= 2)

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Author Ruixuan Zhou [aut, cph], Dave Zhao [aut, cph], Layla Parast [cre]

Maintainer Layla Parast <parast@austin.utexas.edu>

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Description

This function implements the estimation and inference for the indirect effect in high dimensional linear mediation analysis models. It provides estimates and p-values under both incomplete mediation, where a direct effect may exist, as well as complete mediation, where the direct effect is known to be absent.

Usage

hilma(
  Y, 
  G, 
  S, 
  mediation_setting = "incomplete", 
  tuning_method = "uniform", 
  lam_list = NA, 
  min.ratio = 0.1, 
  n.lambda = 5, 
  center = TRUE 
)

Arguments

Y          The n-dimensional outcome vector.
G          The n by p mediator matrix. p can be larger than n.
S          The n by q exposure matrix. q can be 1, and q < n is required.
mediation_setting          Either ‘incomplete’ or ‘complete’
tuning_method          ‘uniform’ or ‘aic’, the default is ‘uniform’
lam_list          tuning parameter for uniform tuning or list of tuning parameter for aic tuning
min.ratio          the ratio of the minimum lambda to the maximum
n.lambda          number of tuning parameters to choose from
center          center the data or not, the default is TRUE

Value

A list with components:

beta_hat          estimated indirect effect
alpha1_hat          estimated direct effect
pvalue_beta_hat          the p value for testing the significance of the indirect effect
lambda_used          lambda used during optimization
Author(s)
Ruixuan Zhou

Examples
n = 30
p = 50
q = 2
G = MASS::mvrnorm(n, rep(0,p), diag(p))
S = as.matrix(MASS::mvrnorm(n, rep(0,q), diag(q)))
Y = as.matrix(rnorm(n))
out = hilma(Y,G,S, mediation_setting = 'complete', tuning_method = 'uniform', lam_list = 0.2)
out

ptehd  Proportion of treatment effect explained by high-dimensional surrogates

Description
Estimates the proportion of the treatment effect explained by the indirect effect via high-dimensional surrogates.

Usage
ptehd(Yt, Yc, St, Sc, lambda_range = c(0, 1))

Arguments
Yt  The n-dimensional outcome vector in the treatment group.
Yc  The n-dimensional outcome vector in the control group.
St  The n x p matrix of surrogates in the treatment group.
Sc  The n x p matrix of surrogates in the treatment group.
lambda_range  Min and max of range of range of tuning parameter to use during the constrained l1 optimization step.

Value
A list with components:
est_id  Estimate of indirect effect, defined as $\int E(Y|S = s, Z = 1)dF(s|Z = 1) - \int E(Y|S = s, Z = 0)dF(s|Z = 0)$
sd_id  Standard deviation of indirect effect estimate
est_total  Estimate of total effect
sd_total  Standard deviation of total effect estimate
V  Covariance matrix of (est_id, est_total)
est_R  Estimate of proportion of treatment effect explained by surrogates
sd_R  Standard deviation of proportion estimate
lambda_used  lambda used during optimization

Author(s)
Ruixuan Zhou

Examples
n = 10
St = replicate(n, rnorm(20, mean = 1))
Sc = replicate(n, rnorm(20))
Yt = 1 + rowSums(St) / 2 + rnorm(n)
Yc = rowSums(Sc) / 3 + rnorm(n)
# Requires installation of mosek to run
## Not run:
out = ptehd(Yt, Yc, St, Sc)
## End(Not run)
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