Package ‘ImpactIV’

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Type Package

Title Identifying Causal Effect for Multi-Component Intervention Using Instrumental Variable Method

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Description In this package, you can find two functions proposed in Ding, Geng and Zhou (2011) to estimate direct and indirect causal effects with randomization and multiple-component intervention using instrumental variable method.

Depends nnet

License GPL (>= 2)

LazyLoad yes

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ImpactIV-package

**Identifying Causal Effect for Multi-Component Intervention Using IV**

**Description**

In this package, you can find two functions proposed in Ding, Geng and Zhou (2011) to estimate direct and indirect causal effects with randomization and multiple-component intervention using instrumental variable method.

**Details**

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**Author(s)**

Maintainer: Peng Ding <dingyunyi@163.com>

**References**


**See Also**

homo_IV1, heter_IV2

**Examples**

data(impact)
Z=impact$Z
A=impact$A
M=impact$M
Y=scale(impact$Y)
X=as.matrix(impact[,5:12])
#continuous variables of X
Xcon = X[, c(1,4,6,8)]
#discrete variables of X
heter_IV2

Xdis = X[, c(2,3,5,7)]

#XX^2
X2 = cbind(X, poly(Xcon, degree = 2, raw = TRUE),
           Xcon*Xdis[,1], Xcon*Xdis[,2], Xcon*Xdis[,3], Xcon*Xdis[,4])

method1 = homo_IV1(Z = Z, A = A, M = M, Y = Y, X = X)
method2 = heter_IV2(Z = Z, A = A, M = M, Y = Y, X = X2,
                     polydegree = 1, step1 = method1,
                     truncate = 0.25, select = "AIC")

---

**heter_IV2**  
*Estimation causal effect under Assumption 7 in Ding et al. (2011)*

**Description**

Estimation causal effect under Assumption 6 in Ding et al. (2011) when the second order moment of the error term is not constant.

**Usage**

heter_IV2(Z, A, M, Y, X, polydegree = 2, step1 = NULL,
          truncate = 0.25, select = NULL)

**Arguments**

- **Z**  
  A vector of the randomization variable.

- **A**  
  A vector of the first mediator: whether a patient receives antidepressant medication.

- **M**  
  A vector of the second mediator: whether a patient receives mental health therapy.

- **Y**  
  A vector of the outcome of interest.

- **X**  
  A matrix of all the covariates.

- **polydegree**  
  The order of the polynomial function.

- **step1**  
  The result of the first step estimation from homo_IV1.

- **truncate**  
  Truncate the estimated Omega using a positive constant.

- **select**  
  Using AIC or BIC for variable selection in the polynomial regression, the default is null.

**Details**

For background of the problem, see Ding et al. (2011).
Value

- **beta**: beta coefficients of Z, A, M and AM.
- **phat**: proportion of randomization to the treatment group.
- **residual**: residuals of the first step regression.
- **se**: standard errors of beta coefficients.
- **zvalue**: z-values of the beta coefficients.
- **pvalue**: p-values of the beta coefficients.
- **CI**: confidence intervals of the beta coefficients.
- **COV**: covariance matrix of the beta coefficients.
- **ser**: robust version of standard errors of beta coefficients.
- **zvaluer**: robust version of z-values of the beta coefficients.
- **pvaluer**: robust version of p-values of the beta coefficients.
- **CIr**: robust version of confidence intervals of the beta coefficients.
- **COVr**: robust version of covariance matrix of the beta coefficients.
- **N**: sample size
- **G**: G is defined in Ding et al. (2010).
- **W**: W is defined in Ding et al. (2010).
- **Omegahat**: Omegahat is is defined in Ding et al. (2010).

Author(s)

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References


Examples

# See help for "ImpactIV"
Estimation causal effect under Assumption 6 in Ding et al. (2011)

Description

Estimation causal effect under Assumption 6 in Ding et al. (2011) when the second order moment of the error term is constant.

Usage

homo_IV1(Z, A, M, Y, X)

Arguments

Z  A vector of the randomization variable.
A  A vector of the first mediator: whether a patient receives antidepressant medication.
M  A vector of the second mediator: whether a patient receives mental health therapy.
Y  A vector of the outcome of interest.
X  A matrix of all the covariates.

Details

For background of the problem, see Ding et al. (2011).

Value

beta  beta coefficients of Z, A, M and AM.
phat  proportion of randomization to the treatment group.
residual  residuals of the regression.
se  standard errors of beta coefficients.
zvalue  z-values of the beta coefficients.
pvalue  p-values of the beta coefficients.
CI  confidence intervals of the beta coefficients.
C0V  covariance matrix of the beta coefficients.
ser  robust version of standard errors of beta coefficients.
zvaluer  robust version of z-values of the beta coefficients.
pvaluer  robust version of p-values of the beta coefficients.
CIr  robust version of confidence intervals of the beta coefficients.
C0Vr  robust version of covariance matrix of the beta coefficients.
N  sample size
G  G is defined in Ding et al. (2010).
W  W is defined in Ding et al. (2010).
Omega  Omega is is defined in Ding et al. (2010).
**Author(s)**

Peng Ding <dingyunyiqiu@163.com>

**References**


**Examples**

```r
##See help for "ImpactIV"
```

---

**impact**

The data for IMPACT program.

**Description**

The data for IMPACT program used in Ding et al. (2011).

**Usage**

```r
data(impact)
```

**Format**

A data frame with 1783 observations on the following 12 variables.

- **Z** randomization
- **A** whether taking antidepressant medications
- **M** whether taking mental health therapy
- **Y** outcome of interest
- **age** age
- **gender** gender
- **race** race
- **edu** education
- **marry** married or not
- **scl0** baseline SCL score
- **work0** work or not
- **inc** income/10000

**Details**

See Ding et al. (2011) for more details of IMPACT program.
References


Examples

data(impact)
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