Package 'ovbsa'

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Title Sensitivity Analysis of Omitted Variable Bias

Version 2.0.0

Description Conduct sensitivity analysis of omitted variable bias in linear econometric models using the methodology presented in Basu (2025) <doi:10.2139/ssrn.4704246>.

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Encoding UTF-8

RoxygenNote 7.3.2

Imports dplyr, lmtest, stats, tidyr

Suggests sensemakr

URL https://github.com/dbasu-umass/ovbsa/, https://github.com/dbasu-umass/ovbsa

BugReports https://github.com/dbasu-umass/ovbsa/issues

NeedsCompilation no

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bsal *basic sensitivity analysis of omitted variable bias*

Description

basic sensitivity analysis of omitted variable bias

Usage

```
bsal(kd, ky, alpha, data, outcome, treatment, bnch_reg, other_reg)
```

Arguments

kd	sensitivity parameter kD (scalar)
ky	sensitivity parameter kY (scalar)
alpha	significance level for hypothesis test (e.g. 0.05)
data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other regressors

Value

a matrix with following rows for case 1, 2 and 3 (in columns):

r2yd.x	partial R2 of Y on D conditioning on X
r2dz.x	partial R2 of D on Z conditioning on X
r2yz.dx	partial R2 of Y on Z conditioning on D and X
estimate	unadjusted parameter estimate
adjusted_estimate	bias-adjusted parameter estimate
adjusted_se	bias-adjusted standard error
adjusted_lower_CI	bias-adjusted confidence interval lower boundary
adjusted_upper_CI	bias-adjusted confidence interval upper boundary

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")


res1 <- bsal(kd=1,ky=1,alpha=0.05,data=darfur,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth)
```

---

kdkyrngpr2ncd *compute max(kD) and max(kY) for partial R2-based analysis without conditioning on treatment*

Description

compute max(kD) and max(kY) for partial R2-based analysis without conditioning on treatment

Usage

```
kdkyrngpr2ncd(data, outcome, treatment, bnch_reg, other_reg = NULL)
```

Arguments

data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other covariates

Value

a data frame with 2 columns and 1 row:

kd_high	max(kD), a scalar
ky_high	max(kY), a scalar

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")


r1 <- kdkyrngpr2ncd(data=darfur,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth)
```

kdkyrngtr2 *compute max(kD) and max(kY) for total R2-based analysis*

Description

compute max(kD) and max(kY) for total R2-based analysis

Usage

```
kdkyrngtr2(data, outcome, treatment, bnch_reg, other_reg = NULL)
```

Arguments

data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other covariates

Value

a data frame with 2 columns and 1 row:

kd_high	max(kD), a scalar
ky_high	max(kY), a scalar

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")


r1 <- kdkyrngtr2(data=darfur,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth)
```

linvx *quasi-triangular probability distribution function*

Description

quasi-triangular probability distribution function

Usage

```
linvx(x, xvec, k)
```

Arguments

x	point (scalar) at which pdf is evaluated
xvec	vector of all possible x values
k	mode and median of the distribution

Value

the value (scalar) of the pdf at x

Examples

```
xfull <- runif(n=100,min=0,max=10)
xpoint <- 5
xmod <- 2
res_pdf <- linvx(x=xpoint,xvec=xfull,k=xmod)
```

pr2ncdbias *bias and std error for (kd,ky) using partial R2-based analysis without conditioning on treatment*

Description

bias and std error for (kd,ky) using partial R2-based analysis without conditioning on treatment

Usage

```
pr2ncdbias(kd, ky, alpha, data, outcome, treatment, bnch_reg, other_reg = NULL)
```

Arguments

kd	sensitivity parameter kD (scalar)
ky	sensitivity parameter kY (scalar)
alpha	significance level for hypothesis test (e.g. 0.05)
data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other covariate(s)

Value

a list with the following elements:

adjestp	Adj std error when unadj estimate>0
adjestn	Adj std error when unadj estimate<0
cilbp	Adj lower boundary of conf int when unadj estimate>0
ciubp	Adj upper boundary of conf int when unadj estimate>0
cilbn	Adj lower boundary of conf int when unadj estimate<0
ciubn	Adj upper boundary of conf int when unadj estimate<0

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")


res4<-pr2ncdbias(kd=1,ky=1,alpha=0.05,data=darfur,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth)
```

---

salpr2ncd *probability of conclusion being overturned using partial R2-based analysis without conditioning on treatment*

Description

probability of conclusion being overturned using partial R2-based analysis without conditioning on treatment

Usage

```
salpr2ncd(
  alpha,
  data,
  outcome,
  treatment,
  bnch_reg,
  other_reg,
  N,
  maxkd = NULL,
  maxky = NULL,
  k_kd = 1,
  k_ky = 1
)
```

Arguments

alpha	significance level (scalar) for hypothesis test (e.g. 0.05)
data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other covariate(s)
N	number of points on grid = N^2
maxkd	max of sensitivity parameter kD
maxky	max of sensitivity parameter kY
k_kd	mode (and median) of sensitivity parameter kD
k_ky	mode (and median) of sensitivity parameter kY

Value

list with the following elements:

dataplot	data set used for contour plot
kdmax	max of sensitivity parameter kD
kymax	max of sensitivity parameter kY
frac_prob	prob of conclusion being overturned (unwt)
frac_prob_wt	prob of conclusion being overturned (wt)
frac_prob_rest	prob of conclusion being overturned (unwt, rest)
frac_prob_rest_wt	prob of conclusion being overturned (wt, rest)

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")

darfur1 <- dplyr::slice_sample(darfur, prop=0.25)

res4 <- salpr2ncd(alpha=0.05,data=darfur1,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth,N=500)
```

`saltr2` *probability of conclusion being overturned using total R2-based analysis*

Description

probability of conclusion being overturned using total R2-based analysis

Usage

```
saltr2(
  alpha,
  data,
  outcome,
  treatment,
  bnch_reg,
  other_reg,
  N,
  maxkd = NULL,
  maxky = NULL,
  k_kd = 1,
  k_ky = 1
)
```

Arguments

`alpha`	significance level for hypothesis test (e.g. 0.05)
`data`	data frame for analysis
`outcome`	name of outcome variable
`treatment`	name of treatment variable
`bnch_reg`	name(s) of benchmark covariate(s)
`other_reg`	name(s) of other covariate(s)
`N`	number of points on grid = N^2

maxkd	max of sensitivity parameter kD
maxky	max of sensitivity parameter kY
k_kd	mode (and median) of sensitivity parameter kD
k_ky	mode (and median) of sensitivity parameter kY

Value

list with the following elements:

dataplot	data set used for contour plot
kdmax	max of sensitivity parameter kD
kymax	max of sensitivity parameter kY
frac_prob	prob of conclusion being overturned (unwt)
frac_prob_wt	prob of conclusion being overturned (wt)
frac_prob_rest	prob of conclusion being overturned (unwt, rest)
frac_prob_rest_wt	prob of conclusion being overturned (wt, rest)

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")

darfur1 <- dplyr::slice_sample(darfur, prop=0.25)

res3 <- saltr2(alpha=0.05,data=darfur1,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth,N=500)
```

---

tr2bias *bias and std error for (kd,ky) using total R2-based analysis*

Description

bias and std error for (kd,ky) using total R2-based analysis

Usage

```
tr2bias(kd, ky, alpha, data, outcome, treatment, bnch_reg, other_reg = NULL)
```

Arguments

kd	sensitivity parameter kD (scalar)
ky	sensitivity parameter kY (scalar)
alpha	significance level for hypothesis test (e.g. 0.05)
data	data frame for analysis
outcome	name of outcome variable
treatment	name of treatment variable
bnch_reg	name(s) of benchmark covariate(s)
other_reg	name(s) of other covariate(s)

Value

a list with the following elements:

adjestp	Adj std error when unadj estimate>0
adjestn	Adj std error when unadj estimate<0
cilbp	Adj lower boundary of conf int when unadj estimate>0
ciubp	Adj upper boundary of conf int when unadj estimate>0
cilbn	Adj lower boundary of conf int when unadj estimate<0
ciubn	Adj upper boundary of conf int when unadj estimate<0

Examples

```
require("sensemakr")
Y <- "peacefactor"
D <- "directlyharmed"
X <- "female"
X_oth <- c("village","age","farmer_dar","herder_dar","pastvoted","hhsize_darfur")


res2 <- tr2bias(kd=1,ky=1,alpha=0.05,data=darfur,outcome=Y,treatment=D,bnch_reg=X,other_reg=X_oth)
```

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