

Package ‘causalsens’

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Title Selection Bias Approach to Sensitivity Analysis for Causal Effects

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Imports stats, graphics, grDevices

Depends R (>= 3.0.0)

Description The causalsens package provides functions to perform sensitivity analyses and to study how various assumptions about selection bias affects estimates of causal effects.

License GPL (>= 2)

URL <https://www.mattblackwell.org/software/causalsens/>

VignetteBuilder knitr

Suggests rmarkdown, knitr

Encoding UTF-8

Collate 'causalsens.R'

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causalsens

*Calculate sensitivity of causal estimates to unmeasured confounding.***Description**

This function performs a sensitivity analysis of causal effects different assumptions about unmeasured confounding, as described by Blackwell (2013).

Usage

```
causalsens(
  model.y,
  model.t,
  cov.form,
  confound = one.sided,
  data,
  alpha,
  level = 0.95
)
```

Arguments

<code>model.y</code>	outcome model object. Currently only handles <code>lm</code> objects.
<code>model.t</code>	propensity score model. Currently assumes a <code>glm</code> object.
<code>cov.form</code>	one-sided formula to describe any covariates to be included in the partial R^2 calculations.
<code>confound</code>	function that calculates the confounding function. This function must take arguments <code>alpha</code> , <code>pscores</code> , and <code>treat</code> . Defaults to <code>one.sided</code> . Other functions included with the package are <code>one.sided.att</code> , <code>alignment</code> , and <code>alignment.att</code> .
<code>data</code>	data frame to find the covariates from <code>cov.form</code> .
<code>alpha</code>	vector of confounding values to pass the confounding function. Defaults to 11 points from -0.5 to 0.5 for binary outcome variable, and 11 points covering the a interval with width equal to the inter-quartile range and centered at 0 for non-binary outcome variables.
<code>level</code>	level of the confidence interval returned.

Value

Returns an object of class `causalsens`.

- `sens` data frame containing `alpha` values, partial R^2 s, estimates, and 95
- `partial.r2` vector of partial R^2 values for the covariates to compare to sensitivity analysis results.

Examples

```
data(lalonge.exp)

ymodel <- lm(re78 ~ treat+age + education + black + hispanic +
married + nodegree + re74 + re75 + u74 + u75, data = lalonge.exp)

pmodel <- glm(treat ~ age + education + black + hispanic + married
+ nodegree + re74 + re75 + u74 + u75, data = lalonge.exp,
family = binomial())

alpha <- seq(-4500, 4500, by = 250)

ll.sens <- causalsens(ymodel, pmodel, ~ age + education, data =
lalonge.exp, alpha = alpha, confound = one.sided.att)
```

lalonge.exp	<i>Experimental data from the job training program first studied by LaLonde (1986)</i>
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Description

A dataset of units in an experimental evaluation of a job training program. Subset to those units with two years of pre-treatment income data.

Usage

```
data(lalonge.exp)
```

Format

A data frame with 445 rows and 12 variables

Details

- age - age in years.
- education - number of years of schooling.
- black - 1 if black, 0 otherwise.
- hispanic - 1 if Hispanic, 0 otherwise.
- married - 1 if married, 0 otherwise.
- nodegree - 1 if no high school degree, 0 otherwise.
- re74 - earnings (\$) in 1974.
- re75 - earnings (\$) in 1975.
- re78 - earnings (\$) in 1978.
- u74 - 1 if unemployed in 1974, 0 otherwise.
- u75 - 1 if unemployed in 1975, 0 otherwise.
- treat - 1 if treated, 0 otherwise.

References

LaLonde, Robert J. (1986). Evaluating the Econometric Evaluations of Training Programs with Experimental Data. *The American Economic Review*, 76(4), 604–620.

lalonge.psid

Non-experimental data from Lalonde (1986)

Description

A dataset of experimental treated units and non-experimental control units from the Panel Study of Income Dynamics (PSID).

Usage

```
data(lalonge.psid)
```

Format

A data frame with 2675 rows and 12 variables

Details

- age - age in years.
- education - number of years of schooling.
- black - 1 if black, 0 otherwise.
- hispanic - 1 if Hispanic, 0 otherwise.
- married - 1 if married, 0 otherwise.
- nodegree - 1 if no high school degree, 0 otherwise.
- re74 - earnings (\$) in 1974.
- re75 - earnings (\$) in 1975.
- re78 - earnings (\$) in 1978.
- u74 - 1 if unemployed in 1974, 0 otherwise.
- u75 - 1 if unemployed in 1975, 0 otherwise.
- treat - 1 if treated, 0 otherwise.

References

LaLonde, Robert J. (1986). Evaluating the Econometric Evaluations of Training Programs with Experimental Data. *The American Economic Review*, 76(4), 604–620.

one.sided	<i>Confounding functions</i>
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Description

Various confounding functions for use with [causalsens](#).

Usage

```
one.sided(alpha, pscores, treat)
alignment(alpha, pscores, treat)
one.sided.att(alpha, pscores, treat)
alignment.att(alpha, pscores, treat)
```

Arguments

alpha	vector of confounding values to use in the sensitivity analysis.
pscores	vector of propensity scores for each unit.
treat	vector of treatment values for each unit.

plot.causalsens	<i>Plot a causal sensitivity analysis.</i>
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Description

Plot the results of a sensitivity analysis against unmeasured confounding as performed by [causalsens](#)

Usage

```
## S3 method for class 'causalsens'
plot(x, type = "r.squared", ...)
```

Arguments

x	causalsens object.
type	a string taking either the value "r.squared" (default), which plots the estimated effects as a function of the partial R-squared values, or "raw", which plots them as a function of the raw confounding values, alpha.
...	other parameters to pass to the plot.

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