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'

RoxygenNote 7.0.2

NeedsCompilation no

Repository CRAN

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R topics documented:

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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

model.y	outcome model object. Currently only handles `lm` objects.
model.t	propensity score model. Currently assumes a `glm` object.
cov.form	one-sided formula to describe any covariates to be included in the parital R^2 calculations.
confound	function that calculates the confounding function. This function must take arguments `alpha`, `pscores`, and `treat`. Defaults to one.sided. Other functions included with the package are one.sided.att, alignment, and alignment.att.
data	data frame to find the covariates from `cov.form`.
alpha	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.
level	level of the confidence interval returned.

Value

Returns an object of class `causalsens`.

- `sens` data frame containing alpha values, partial R^2s, estimates, and 95

- `partial.r2` vector of partial R^2 values for the covariates to compare to sensitivity analysis results.

Examples

```
data(lalonde.exp)

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

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

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

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

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lalonde.exp   *Experimental data from the job training program first studied by*
LaLonde (1986)

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(lalonde.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.

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lalonde.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(lalonde.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.

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one.sided   *Confounding functions*

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.

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plot.causalsens   *Plot a causal sensitivity analysis.*

Description

Plot the results of a sensitivity analysis against unmeasured confounding as perfomed 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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