

Package ‘oesr’

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Title Methods for the Office of Evaluation Sciences

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Description Methods for statistical analysis and reporting preferred by the US Office of Evaluation Sciences (OES). This package prepares data from standard model output objects (such as from `lm()` and `estimatr::lm_robust()`) and creates visualizations of treatment effects from the prepared quantities, according to the standards of the US Office of Evaluation Sciences.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.2.3

Imports broom, dplyr, estimatr, extrafont, ggplot2, rlang, sandwich, stats, tibble

Depends R (>= 2.10)

NeedsCompilation no

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df_oes	<i>Sample Data for OES</i>
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Description

A simulated dataset containing outcomes, intervention variables, and covariates.

Usage

```
df_oes
```

Format

A data frame with 10000 rows and 7 variables:

x1 A binary 0/1 treatment assignment.

x2 A four-level factor treatment assignment with levels "0", ..., "3".

y1 A binary 0/1 outcome.

y2 A binary 0/1 outcome.

z1 A continuous normally-distributed covariate.

z2 A binary 0/1 covariate.

z3 A six-level factor covariate with levels "0", ..., "5".

oes_plot	<i>Create OES Plot</i>
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Description

Plot experimental results using OES style

Usage

```
oes_plot(  
  prep,  
  font = "sans",  
  device = "pdf",  
  treatment_fill = "#F2C446",  
  control_fill = "#2E9AC4",  
  digits = 3,  
  report_stars = TRUE,  
  xlab,  
  ylab,  
  title = "Outcomes under Treatment",  
  save = FALSE,  
)
```

```

    name_save = "figure1.png",
    base_size = 12,
    width = 3.1,
    height = 4,
    dpi_forplot = 300
  )

```

Arguments

prep	A tidy tibble of estimates to plot, such as the output from oes_prep().
font	Optional string giving font; defaults to "sans".
device	Set device for loading fonts. Default is "pdf".
treatment_fill	Bar color for treatment conditions.
control_fill	Bar color for control condition.
digits	Integer representing number of digits after decimal point to report. Defaults to 3.
report_stars	Logical indicating whether to display asterisks for statistical significance. Defaults to TRUE.
xlab	String providing the <i>x</i> -axis label.
ylab	String providing the <i>y</i> -axis label.
title	String providing the plot title.
save	Logical indicating whether to save the plot. Defaults to FALSE. If TRUE, the plot is not returned, but a file is saved using ggsave.
name_save	File name for saved plot.
base_size	Base font size for plot.
width	Width of saved plot (in inches). Use 6.8 for multiple columns.
height	Height of saved plot (in inches).
dpi_forplot	Resolution of saved plot.

Details

oes_plot plots the observed response mean of a control group and the predicted response means of one or more treatment groups based on OES guidance on data reporting and visualization best-practice. Read more about this OES guidance at <https://oes.gsa.gov/assets/files/reporting-statistical-results.pdf>.

Value

A plot; if save = TRUE, a file containing a plot.

Author(s)

Miles Williams

Examples

```

data(df_oes)

# Single binary treatment:
fit <- lm(y1 ~ x1, df_oes)

# Multiple treatment conditions:
fit2 <- lm(y2 ~ x2, df_oes)

# Using HC2 SE's from lm_robust():
fit_robust <- estimatr::lm_robust(y1 ~ x1, df_oes)
fit_robust2 <- estimatr::lm_robust(y2 ~ x2, df_oes)

# Using covariates and lm():
fit_covars <- lm(y2 ~ x2 + z1 + z2 + z3, df_oes)

# Using covariates and lm_robust():
fit_covars_robust <- estimatr::lm_robust(y2 ~ x2 + z1 + z2 + z3, df_oes)

# Specify treatment_arms:
oes_prep(fit, treatment_arms = 1) |> oes_plot()

# Specify treatment_vars:
fit |>
  oes_prep(treatment_vars = "x1") |>
  oes_plot()

# Specify treatment_arms:
oes_prep(fit2, treatment_arms = 3) |>
  oes_plot()

# Specify treatment_vars:
fit2 |>
  oes_prep(treatment_vars = c("x21", "x22", "x23")) |>
  oes_plot()

# Specify custom treatment_labels:
prep_w_labels <- oes_prep(fit2, treatment_arms = 3,
  treatment_labels = c(
    "Email",
    "Email +\nReward",
    "Email +\nRisk"),
  control_label = "Status Quo")

oes_plot(prepare_w_labels)

# Using objects from estimatr::lm_robust():
oes_prep(fit_robust, treatment_arms = 1) |> oes_plot()

oes_prep(fit_robust2, treatment_arms = 3) |> oes_plot()

```

```

# Specify covariates with lm:
oes_prep(fit_covars, treatment_arms = 3) |> oes_plot()

# Specify covariates with lm_robust():
oes_prep(fit_covars_robust, treatment_arms = 3) |> oes_plot()

# For the Lin estimator, a manual version of lm_lin():
m.mat <- cbind(y2 = df_oes$y2, model.matrix(y2 ~ x2 + z1 + z2 + z3, df_oes)[, -1])
m.mat <- dplyr::mutate_at(
  data.frame(m.mat),
  .vars = c('z1', 'z2', 'z31', 'z32', 'z33', 'z34', 'z35'),
  function(x) x - mean(x)
)

fit_lin <- estimatr::lm_robust(y2 ~ (x21 + x22 + x23) *
  (z1 + z2 + z31 + z32 + z33 + z34 + z35), m.mat)

oes_prep(fit_lin, treatment_arms = 3) |> oes_plot()

```

oes_prep

Prepare Model Output for OES Plots

Description

Prepare output of linear modeling object into a tidy data table to feed into OES plotting function

Usage

```

oes_prep(
  model,
  treatment_vars = NULL,
  treatment_arms = NULL,
  scale = c("response", "percentage"),
  treatment_labels,
  control_label,
  alpha_level = 0.05
)

```

Arguments

model	An object of class <code>lm</code> or <code>lm_robust</code>
treatment_vars	An optional character vector of treatment arm names. One of <code>treatment_vars</code> or <code>treatment_arms</code> must be supplied.
treatment_arms	An optional numeric value indicating the number of treatment arms. (Not required if <code>treatment_vars</code> is given explicitly.) One of <code>treatment_vars</code> or <code>treatment_arms</code> must be supplied.

scale	String indicating the y -axis scale. Default is 'response'. For binary outcomes, it may be desirable to set to "percentage".
treatment_labels	Optional vector of string labels providing treatment condition(s)
control_label	Optional string providing control condition label
alpha_level	The level at which to reject the null hypothesis for adding asterisks to plots. Set to 0.05 by default. This value also determines the size of the confidence intervals ($\alpha_level = 0.05$ corresponds to 95% confidence intervals).

Details

oes_prep() takes a linear modeling output object (from lm() or lm_robust()) and returns a tidy tibble of estimates, confidence bounds, and related quantities ready for oes_plot to plot. Functionality for lm_lin() objects is in development.

Value

A tibble of $T + 1$ rows and 8 columns, where T is the number of treatment conditions specified via treatment_vars or treatment_arms.

Author(s)

Miles Williams

Examples

```
data(df_oes)

# Single binary treatment:
fit <- lm(y1 ~ x1, df_oes)

# Multiple treatment conditions:
fit2 <- lm(y2 ~ x2, df_oes)

# Using HC2 SE's from lm_robust():
fit_robust <- estimatr::lm_robust(y1 ~ x1, df_oes)
fit_robust2 <- estimatr::lm_robust(y2 ~ x2, df_oes)

# Using covariates and lm():
fit_covars <- lm(y2 ~ x2 + z1 + z2 + z3, df_oes)

# Using covariates and lm_robust():
fit_covars_robust <- estimatr::lm_robust(y2 ~ x2 + z1 + z2 + z3, df_oes)

# Example specifying number of treatment arms:
oes_prep(fit, treatment_arms = 1)

# Example specifying name of treatment variable:
oes_prep(fit, treatment_vars = "x1")
```

```

# Example reporting outcomes as percentages:
oes_prep(fit, treatment_vars = "x1", scale = "percentage")

# Example specifying several treatment arms, labels, etc.:
oes_prep(fit2, treatment_arms = 3,
  treatment_labels = c(
    "Email",
    "Email +\nReward",
    "Email +\nRisk"),
  control_label = "Status Quo",
  scale = "percentage")

# Examples with lm_robust():
oes_prep(fit_robust, treatment_arms = 1)
oes_prep(fit_robust2, treatment_arms = 3)

# Examples with covariates:
oes_prep(fit_covars, treatment_arms = 3)
oes_prep(fit_covars_robust, treatment_arms = 3)

```

 theme_oes

Render OES Theme

Description

Defines the OES plotting theme

Usage

```
theme_oes(base_size = 12, base_family = "Lato", device = "pdf")
```

Arguments

base_size	An integer specifying a font size; defaults to 12.
base_family	A character string identifying a font family; defaults to the OES-preferred "Lato".
device	A character string identifying a plotting device; defaults to "pdf".

Details

A list of length 93 of classes theme and gg that defines elements of the display other than the data. theme_oes() wraps ggplot2::theme_bw() and replaces several default values.

Value

A list specifying a ggplot theme. See Details for more.

Author(s)

Miles Williams

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