

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.

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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(prep_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 <i>y</i> -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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