Package 'ggpower'

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Title Publication-Ready Power Analysis and Visualization

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Description Provides statistical power analysis and sample size calculations for t-tests, ANOVA, regression, chi-square, proportion, correlation, nonparametric, biomarker, and clinical trial designs. Includes a scriptable API via power_compute(), publication-ready 'ggplot2' visualizations, and an optional 'Shiny' application.

URL https://github.com/YaoxiangLi/ggpower, https://yaoxiangli.github.io/ggpower/

BugReports https://github.com/YaoxiangLi/ggpower/issues

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Contents

`effect_size_helpers` *Effect-size helper functions*

Description

Helpers used by the GUI effect-size drawer and by scripting workflows.

Usage

```
effect_size_d(mean_h1, mean_h0 = 0, sd)
effect_size_f(eta2)
effect_size_f2(r2)
effect_size_f2_increase(r2_full, r2_reduced)
effect_size_h(p1, p2)
effect_size_q(r1, r2)
effect_size_w(p0, p1)
eta2_from_f(f)
odds_ratio_from_probs(p0, p1)
r2_from_f2(f2)
```

Arguments

`mean_h1`, `mean_h0`	Means used to compute Cohen's d.
`sd`	Common standard deviation.
`eta2`	Eta-squared value.
`r2`, `r2_full`, `r2_reduced`	R-squared values; `r2` is also the second correlation in `effect_size_q()`.
`p0`, `p1`, `p2`	Probabilities or probability vectors.
`r1`	First correlation in `effect_size_q()`.
`f`, `f2`	Cohen effect-size values.

Value

A numeric effect-size or converted variance-explained value.

`format_result_html` *Format a ggpower result as structured HTML for Shiny UI*

Description

Renders metric cards, input/output blocks, and notes for the Shiny app.

Usage

```
format_result_html(x)
```

Arguments

`x`	A `ggpower_result` object.

Value

A `shiny.tag` list suitable for `renderUI`.

`ggpower_calculator` *Evaluate a ggpower calculator script*

Description

Evaluates distribution-function calculator expressions, including helpers such as `zcdf()`, `tinv()`, `ncfcdf()`, and `binocdf()`.

Usage

```
ggpower_calculator(script)
```

Arguments

`script`	Character calculator script with arithmetic, assignments, comments, and supported distribution helper functions.

Value

The value of the final expression.

Examples

```
ggpower_calculator("x <- 2^3\nx + zinv(.975)")
```

ggpower_result *Create a ggpower result object*

Description

Creates the common result object used by the scriptable API and Shiny GUI.

Usage

```
ggpower_result(test, analysis, inputs, outputs, notes = character(),
  distribution = list())
```

Arguments

test	Character label for the selected test.
analysis	Character label for the selected analysis mode.
inputs	Named list of input parameters.
outputs	Named list of computed output parameters.
notes	Character vector with method notes or assumptions.
distribution	Named list describing the H0/H1 distributions.

Value

An object of class ggpower_result.

ggpower_tests *List supported statistical power tests*

Description

Lists the tests available to power_compute().

Usage

```
ggpower_tests(domain = NULL, module = NULL)
```

Arguments

domain	Optional character vector to filter by domain (general, biomarker, pharma).
module	Optional character vector to filter by app module (workspace, biomarker, clinical).

Value

A data frame describing tests available to power_compute().

Examples

```
ggpower_tests()
ggpower_tests(module = "biomarker")
```

`ggpower_ttest` *Plot Power Curve for a Two-Sample t-Test*

Description

This function creates a ggplot2 power curve for a two-sample t test.

Usage

```
ggpower_ttest(d, alpha = 0.05, n_range = seq(10, 100, by = 5),
  tails = "two")
```

Arguments

`d`	Numeric. The effect size (Cohen's d).
`alpha`	Numeric. The significance level (default 0.05).
`n_range`	Numeric vector. A vector of sample sizes per group (default is seq(10, 100, by = 5)).
`tails`	Character. `"two"` or `"one"`.

Value

A ggplot object showing the power curve.

Examples

```
# Create a power curve for d = 0.5 over a range of sample sizes per group
ggpower_ttest(d = 0.5, alpha = 0.05, n_range = seq(10, 100, by = 5))
```

`ggpower_t_one_sample` *Plot Power Curve for a One-Sample t-Test*

Description

This function creates a ggplot2 power curve for a one-sample t test.

Usage

```
ggpower_t_one_sample(d, alpha = 0.05, n_range = seq(20, 100, by = 5),
  tails = "two")
```

Arguments

d	Numeric. The effect size (d).
alpha	Numeric. The significance level (default 0.05).
n_range	Numeric vector. A vector of total sample sizes (default is seq(20, 100, by = 5)).
tails	Character. "two" or "one".

Value

A ggplot object showing the power curve.

Examples

```
# Plot power curve for d = 0.5 over sample sizes from 20 to 100
ggpower_t_one_sample(d = 0.5, alpha = 0.05, n_range = seq(20, 100, by = 5))
```

---

plot_distribution *Plot H0 and H1 distributions*

Description

Builds a publication-ready distribution overlay for a computed power-analysis result.

Usage

```
plot_distribution(result)
```

Arguments

result	A ggpower_result object.

Value

A ggplot object.

Examples

```
result <- power_compute("t_one_sample", "post_hoc", d = 0.5, n = 40)
plot_distribution(result)
```

plot_power_curve *Plot a power curve*

Description

Builds a publication-ready power curve for a selected ggpower test.

Usage

```
plot_power_curve(test, n_values, analysis = "post_hoc", ...)
```

Arguments

test	Character test id.
n_values	Numeric vector of total sample sizes.
analysis	Power analysis mode used for fixed parameters.
...	Test-specific fixed parameters.

Value

A ggplot object.

Examples

```
plot_power_curve("t_one_sample", n_values = c(20, 30, 40), d = 0.5)
```

power_compute *Compute statistical power analyses*

Description

Runs a power analysis using the shared ggpower compute engine. The function supports classical test families and analysis modes.

Usage

```
power_compute(test, analysis = "post_hoc", ...)
```

Arguments

test	Character test id. Use `ggpower_tests()` to list available ids.
analysis	One of `"a_priori"`, `"compromise"`, `"criterion"`, `"post_hoc"`, or `"sensitivity"`.
...	Test-specific input parameters.

Value

A ggpower_result list with components test, analysis, inputs, outputs, and optional notes and distribution. The outputs element contains the solved quantities (for example sample size, power, or effect size depending on the analysis mode). See ggpower_result.

Examples

```
power_compute("t_one_sample", "a_priori", d = 0.625, alpha = 0.05,
  power = 0.95, tails = "one")
```

---

power_t_one_sample *Compute Power for a One-Sample t-Test*

Description

Calculates the power for a one-sample t-test given the effect size (d), total sample size (n), and significance level (alpha).

Usage

```
power_t_one_sample(d, n, alpha = 0.05, tails = "two")
```

Arguments

d	Numeric. The effect size (difference from the constant divided by sigma).
n	Integer. Total sample size.
alpha	Numeric. The significance level (default is 0.05).
tails	Character. "two" for a two-tailed test or "one" for a one-tailed test.

Value

Numeric. The computed power (1 - beta).

Examples

```
# Calculate power for an effect size of 0.5 with n = 40 subjects
power_t_one_sample(d = 0.5, n = 40, alpha = 0.05)
```

power_t_paired *Compute power for a paired-samples t-test*

Description

Computes achieved power for a paired-samples t-test using the noncentral t kernel.

Usage

```
power_t_paired(d, n, alpha = 0.05, tails = "two")
```

Arguments

d	Numeric paired-samples effect size dz.
n	Integer number of pairs.
alpha	Numeric significance level.
tails	Character, "two" or "one".

Value

Numeric power.

Examples

```
power_t_paired(d = 0.5, n = 40)
```

power_t_two_sample *Compute Power for a Two-Sample t-Test (Equal Sample Sizes)*

Description

This function calculates the power for a two-sample t-test when the two groups have equal sample sizes.

Usage

```
power_t_two_sample(d, n_per_group, alpha = 0.05, tails = "two", n2 = NULL)
```

Arguments

d	Numeric. The effect size (Cohen's d).
n_per_group	Integer. The sample size per group.
alpha	Numeric. The significance level (default is 0.05).
tails	Character. "two" for a two-tailed test or "one" for a one-tailed test.
n2	Optional second-group sample size. If omitted, equal group sizes are used.

Value

Numeric. The computed power (1 - beta).

Examples

```
# Compute power for an effect size d = 0.5 with 30 subjects per group
power_t_two_sample(d = 0.5, n_per_group = 30)
```

`run_app` *Run the Shiny Application*

Description

Run the Shiny Application

Usage

```
run_app(
  onStart = NULL,
  options = list(),
  enableBookmarking = NULL,
  uiPattern = "/",
  ...
)
```

Arguments

`onStart`	A function that will be called before the app is actually run. This is only needed for `shinyAppObj`, since in the `shinyAppDir` case, a `global.R` file can be used for this purpose.
`options`	Named options that should be passed to the `runApp` call (these can be any of the following: "port", "launch.browser", "host", "quiet", "display.mode" and "test.mode"). You can also specify `width` and `height` parameters which provide a hint to the embedding environment about the ideal height/width for the app.
`enableBookmarking`	Can be one of `"url"`, `"server"`, or `"disable"`. The default value, `NULL`, will respect the setting from any previous calls to `enableBookmarking()`. See `enableBookmarking()` for more information on bookmarking your app.
`uiPattern`	A regular expression that will be applied to each `GET` request to determine whether the `ui` should be used to handle the request. Note that the entire request path must match the regular expression in order for the match to be considered successful.
`...`	arguments to pass to golem_opts. See `?golem::get_golem_options` for more details.

Value

A Shiny application object (class "shiny.appobj"), returned invisibly. Launch the GUI with shiny::runApp(run_app()) or from the development helper described in the package overview.

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save_power_plot *Save a ggpower plot*

Description

Exports publication-ready ggpower plots through ggplot2::ggsave().

Usage

```
save_power_plot(plot, filename, width = 7, height = 5, dpi = 320)

save_distribution_plot(plot, filename, width = 7, height = 5, dpi = 320)
```

Arguments

plot	A ggplot object.
filename	Output filename.
width, height	Plot dimensions.
dpi	Resolution for raster outputs.

Value

The filename invisibly.

---

theme_ggpower *Publication-ready ggpower theme*

Description

Provides consistent typography, spacing, and grid styling for ggpower figures.

Usage

```
theme_ggpower(base_size = 12, base_family = "")
```

Arguments

base_size	Base font size.
base_family	Base font family.

Value

A ggplot2 theme.

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