Package 'easypower'

March 11, 2024

Type Package

Title Sample Size Estimation for Experimental Designs

Version 1.0.2

Date 2024-03-10

Author Aaron McGarvey

Maintainer Aaron McGarvey `<amcgarvey271@gmail.com>`

Description Power analysis is used in the estimation of sample sizes for
experimental designs. Most programs and R packages will only output the highest
recommended sample size to the user. Often the user input can be complicated
and computing multiple power analyses for different treatment comparisons can
be time consuming. This package simplifies the user input and allows the user
to view all of the sample size recommendations or just the ones they want to see.
The calculations used to calculate the recommended sample sizes are from the
'pwr' package.

License GPL (>= 3)

Imports pwr (>= 1.1-3)

Suggests knitr

VignetteBuilder knitr

NeedsCompilation no

Repository CRAN

Date/Publication 2024-03-10 23:10:02 UTC

R topics documented:

---

easypower   *Sample Size Calculations Using Power Analysis*

Description

Power analysis is used in the estimation of sample sizes for experimental designs. Most programs
and R packages will only output the highest recommended sample size to the user. Often the user
input can be complicated and computing multiple power analyses for different treatment compar-
isons can be time consuming. This package simplifies the user input and allows the user to view all
of the sample size recommendations or just the ones they want to see. Currently, one-way ANOVAs
`n.oneway` and factorial ANOVAs `n.multiway` are supported. The effect size utilized by the func-
tions is eta-squared which is equivalent to percentage variance. It is used in the input for all of the
functions so that the user may use one standard effect size for all of their calculations. The calcula-
tions used to calculate the recommended sample sizes are from the 'pwr' package. Future updates
are planned to add more experimental designs.

Details

Package:	easypower
Type:	Package
Version:	1.0.1
Date:	2015-11-04
License:	GPL (>=3)

Author(s)

Author:	Aaron McGarvey <amcgarve@mail.uoguelph.ca>
Maintainer:	Aaron McGarvey <amcgarve@mail.uoguelph.ca>

---

n.multiway   *Sample size calculations for factorial ANOVAs*

Description

Sample size calculations for factorial ANOVAs

Usage

```
n.multiway(iv1 = NULL, iv2 = NULL, iv3 = NULL, iv4 = NULL,
  interaction.eta2 = "small", sig.level = 0.05, power = 0.8,
  result = "all", ...)
```

Arguments

`iv1`	The list of data for treatment 1.
`iv2`	The list of data for treatment 2.
`iv3`	(optional) The list of data for treatment 3.
`iv4`	(optional) The list of data for treatment 4.
`interaction.eta2`	
	(optional) Either a character string or numeric value of the desired eta squared. Default is set to "small".
`sig.level`	(optional) Desired significance level. Default value is 0.05.
`power`	(optional) Desired level of power. Default value is 0.80.
`result`	The amount of data that will be output to the user (*default = "all"*). The following are the three output options the user may specify:

- result = "all" - Outputs the sample size recommendations for all treatments and all possible interactions.
- result = "highest" - Outputs the highest recommended sample size.
- result = "select" - Outputs specific results to the user. If there has been previous research on an effect, the user may input a numeric value for the effect size. The output will consist of the highest recommended sample size and the recommendations where the user input a numeric value for the effect size of a treatment.

`...`	Extra interactions to pass in. In order to change the effect size of a specific interaction an interaction effect may be added to the function. It must take the form: *int# = int.eff.#*.

Details

Acceptable effect size character string values and their numeric equivalents are: "small" (0.01), "med" (0.06), and "large" (0.14).

Note

Sample size recommendations are rounded up to the nearest integer. More detailed examples on n.multiway can be viewed in the vignette.

References

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Examples

```
# Exercise 8.15, p.400 from Cohen (1988)
# Defining the treatments
main.eff.1 <- list(name = "R", levels = 2, eta.sq = 0.123)
main.eff.2 <- list(name = "C", levels = 4, eta.sq = 0.215)
# Running n.multiway
n.multiway(iv1=main.eff.1, iv2=main.eff.2, interaction.eta2 = 0.079)
# To just view highest
n.multiway(iv1=main.eff.1, iv2=main.eff.2, interaction.eta2 = 0.079, result = "highest")

# Exercise 8.14, p.397 from Cohen (1988)
# Defining the treatments and interaction
main.eff.1 <- list(name = "Sex", levels = 2, eta.sq = 0.0099)
main.eff.2 <- list(name = "Age", levels = 3, eta.sq = 0.0588)
main.eff.3 <- list(name = "Conditions", levels = 4, eta.sq = 0.1506)
# Running n.multiway
n.multiway(iv1=main.eff.1, iv2=main.eff.2, iv3=main.eff.3, interaction.eta2 = 0.0588)
```

---

n.oneway	*Calculates the required sample size for a one-way ANOVA.*

Description

Calculates the required sample size for a one-way ANOVA.

Usage

```
n.oneway(iv = iv, sig.level = 0.05, power = 0.8)
```

Arguments

iv	List of data for the treatment to be tested.
sig.level	Desired significance level (default is 0.05).
power	Desired level of power (default is 0.80).

Value

Returns the recommended sample size given the conditions to achieve the desired power.

References

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Examples

```
# Exercise 8.10, p.391 from Cohen (1988)
main.eff <- list(name = "Teaching", levels = 4, eta.sq = 0.0588)
# Running the function with default settings
n.oneway(iv = main.eff)
```

Index