Package 'metapower'

September 20, 2020

Type Package

Title Power Analysis for Meta-Analysis

Version 0.2.0

Description
A simple and effective tool for computing and visualizing statistical power for meta-analysis, including power analysis of main effects, test of homogeneity, subgroup analysis, and categorical moderator analysis.

Depends R (>= 3.6)

License GPL-2

Encoding UTF-8

LazyData true

Imports cowplot (>= 1.0.0), dplyr (>= 0.8.5), ggplot2 (>= 3.3.0), knitr (>= 1.28), magrittr (>= 1.5), tidyr (>= 1.0.2), testthat (>= 2.3.2), rlang (>= 0.4.5)

Suggests markdown (>= 2.1)

VignetteBuilder knitr

RoxygenNote 7.1.1

NeedsCompilation no

Author Jason Griffin [aut, cre]

Maintainer Jason Griffin <jasongriffin138@gmail.com>

Repository CRAN

Date/Publication 2020-09-19 22:20:11 UTC

R topics documented:

`homogen_power` *Compute Power for Test of Homogeneity in Meta-analysis*

Description

Compute statistical power for the Test of Homogeneity for meta-analysis under both fixed- and random-effects models.

Usage

```
homogen_power(effect_size, sample_size, k, es_type, p = 0.05, con_table = NULL)
```

Arguments

`effect_size`	Numerical value of effect size.
`sample_size`	Numerical value for number number of participants (per study).
`k`	Numerical value for total number of studies.
`es_type`	'Character reflecting effect size metric: 'r', 'd', or 'or'.
`p`	Numerical value for significance level (Type I error probability).
`con_table`	(Optional) Numerical values for 2x2 contingency table as a vector in the following format: c(a,b,c,d).

2x2 Table	Group 1	Group 2
Present	a	b
Not Present	c	d

Value

Estimated Power to detect differences in homogeneity of effect sizes for fixed- and random-effects models

References

Borenstein, M., Hedges, L. V., Higgins, J. P. T. and Rothstein, H. R.(2009). Introduction to meta-analysis, Chichester, UK: Wiley.

Hedges, L., Pigott, T. (2004). The Power of Statistical Tests for Moderators in Meta-Analysis, Psychological Methods, 9(4), 426-445. doi: https://dx.doi.org/10.1037/1082-989x.9.4.426

Pigott, T. (2012). Advances in Meta-Analysis. doi: https://dx.doi.org/10.1007/978-1-4614-2278-5

See Also

https://jason-griffin.shinyapps.io/shiny_metapower/

Examples

```
homogen_power(effect_size = .5, sample_size = 10, k = 10, es_type = "d")
```

---

mod_power *Compute Power for Categorical Moderator Analysis in Meta-analysis*

Description

Computes statistical power for categorical moderator analysis under fixed and random effects models.

Usage

```
mod_power(
  n_groups,
  effect_sizes,
  sample_size,
  k,
  es_type,
  p = 0.05,
  con_table = NULL
)
```

Arguments

n_groups	Numerical value for the levels of a categorical variable.
effect_sizes	Numerical values for effect sizes of for each group.
sample_size	Numerical value for number of participants (per study).
k	Numerical value for total number of studies.
es_type	Character reflecting effect size metric: 'r', 'd', or 'or'.
p	Numerical value for significance level (Type I error probability).
con_table	(Optional) List of numerical values for 2x2 contingency tables as a vector in the following format: c(a,b,c,d). These should be specified for each group(i.e., n_groups).

2x2 Table	Group 1	Group 2
Present	a	b
Not Present	c	d

Value

Estimated Power estimates for moderator analysis under fixed- and random-effects models

See Also

https://jason-griffin.shinyapps.io/shiny_metapower/

Examples

```
mod_power(n_groups = 2,
          effect_sizes = c(.1,.5),
          sample_size = 20,
          k = 10,
          es_type = "d")
mod_power(n_groups = 2,
          con_table = list(g1 = c(6,5,4,5), g2 = c(8,5,2,5)),
          sample_size = 40,
          k = 20,
          es_type = "or")
```

---

mpower *Compute Power for Meta-analysis*

Description

Computes statistical power for summary effect sizes in meta-analysis.

Usage

```
mpower(
  effect_size,
  sample_size,
  k,
  es_type,
  test_type = "two-tailed",
  p = 0.05,
  con_table = NULL
)
```

Arguments

effect_size	Numerical value of effect size.
sample_size	Numerical value for number number of participants (per study).
k	Numerical value for total number of studies.
es_type	Character reflecting effect size metric: 'r', 'd', or 'or'.
test_type	Character value reflecting test type: ("two-tailed" or "one-tailed").

p	Numerical value for significance level (Type I error probability).
con_table	(Optional) Numerical values for 2x2 contingency table as a vector in the following format: c(a,b,c,d).

2x2 Table	Group 1	Group 2
Present	a	b
Not Present	c	d

Value

Estimated Power

References

Borenstein, M., Hedges, L. V., Higgins, J. P. T. and Rothstein, H. R.(2009). Introduction to meta-analysis, Chichester, UK: Wiley.

Hedges, L., Pigott, T. (2004). The Power of Statistical Tests for Moderators in Meta-Analysis, Psychological Methods, 9(4), 426-445 doi: https://dx.doi.org/10.1037/1082-989x.9.4.426

Pigott, T. (2012). Advances in Meta-Analysis. doi: https://dx.doi.org/10.1007/978-1-4614-2278-5

Jackson, D., Turner, R. (2017). Power analysis for random-effects meta-analysis, Research Synthesis Methods, 8(3), 290-302 doi: https://dx.doi.org/10.1002/jrsm.1240

See Also

https://jason-griffin.shinyapps.io/shiny_metapower/

Examples

```
mpower(effect_size = .2, sample_size = 10, k = 10, es_type = "d")
```

---

plot_homogen_power *Plot Power Curve for Test of Homogeneity*

Description

Plots power curves for the test of homogeneity for different levels of within-study variation for fixed effects models. For random-effects models, power curves are plotted for various levels of heterogeneity.

Usage

```
plot_homogen_power(obj)
```

Arguments

obj	should be an "homogen_power" object

Value

Power curve plot for the user specified input parameters

`plot_mod_power` *Plot Power Curve for Categorical Moderators*

Description

Plots power curves for categorical moderator in meta-analysis

Usage

```
plot_mod_power(obj)
```

Arguments

`obj`	This should be an 'mod_power' object

Value

Power curves for moderator analysis under fixed and random effects models

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`plot_mpower` *Plot Power Curve for Meta-analysis*

Description

Plots power curves for fixed effects models with various effect size magnitudes. Also plots power curves for various levels of heterogeneity (e.g., i2 = 75

Usage

```
plot_mpower(obj)
```

Arguments

`obj`	This should be an "mpower" object

Value

Power curve plot for the user specified input parameters

plot_subgroup_power *Plot Power Curve for Subgroup analysis*

Description

Plots power curves to detect subgroup differences in meta-analysis.

Usage

```
plot_subgroup_power(obj)
```

Arguments

obj	This should be an 'subgroup_power' object

Value

Power curves to detect subgroup differences for fixed and random effects models

subgroup_power *Compute Power for Subgroup Analysis in Meta-analysis*

Description

Computes statistical power for different subgroups under fixed and random effects models.

Usage

```
subgroup_power(
  n_groups,
  effect_sizes,
  sample_size,
  k,
  es_type,
  p = 0.05,
  con_table = NULL
)
```

Arguments

n_groups	Numerical value for the number of subgroups.
effect_sizes	Numerical values for effect sizes of for each group.
sample_size	Numerical value for number of participants (per study).
k	Numerical value for total number of studies.
es_type	Character reflecting effect size metric: 'r', 'd', or 'or'.

p — Numerical value for significance level (Type I error probability).

con_table — (Optional) List of numerical values for 2x2 contingency tables as a vector in the following format: c(a,b,c,d). These should be specified for each subgroup (i.e., n_groups).

2x2 Table	Group 1	Group 2
Present	a	b
Not Present	c	d

Value

Estimated Power estimates for subgroup differences under fixed- and random-effects models

See Also

https://jason-griffin.shinyapps.io/shiny_metapower/

Examples

```
subgroup_power(n_groups = 2,
               effect_sizes = c(.1,.5),
               sample_size = 20,
               k = 10,
               es_type = "d")
subgroup_power(n_groups = 2,
               con_table = list(g1 = c(6,5,4,5), g2 = c(8,5,2,5)),
               sample_size = 40,
               k = 20,
               es_type = "or")
```

Index