Package 'BayesPower'

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Title Sample Size and Power Calculation for Bayesian Testing with Bayes Factor

Version 1.0.1

Description The goal of 'BayesPower' is to provide tools for Bayesian sample size determination and power analysis across a range of common hypothesis testing scenarios using Bayes factors. The main function, BayesPower_BayesFactor(), launches an interactive 'shiny' application for performing these analyses. The application also provides command-line code for reproducibility. Details of the methods are described in the tutorial by Wong, Pawel, and Tendeiro (2025) <doi:10.31234/osf.io/pgdac_v1>.

BugReports https://github.com/tkWong3004/BayesPower/issues

License GPL (>= 3)

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Contents

`BayesPower_BayesFactor` *Launch the BayesPower Shiny Application*

Description

This function starts the interactive Shiny application for Bayesian power analysis using Bayes factors. The app provides a graphical user interface built with **shiny**.

Usage

```
BayesPower_BayesFactor()
```

Details

The application includes both the UI and server components, which are defined internally in the package. When run, a browser window or RStudio viewer pane will open to display the interface.

Value

No return value, called for its side effects.

Examples

```
if (interactive()) {
  # Launch the Shiny application
  BayesPower_BayesFactor()
}
```

`BF10.bin.test` *Bayes factor for a Bayesian one-proportion test*

Description

Calculate the Bayes factor (BF10) for a test of a single proportion, either against a point null or an interval null hypothesis.

Usage

```
BF10.bin.test(x, n, alpha, beta, location, scale, model, hypothesis, e = NULL)
```

Arguments

`x`	Observed number of successes.
`n`	Sample size.
`alpha`	Parameter for the analysis beta prior under the alternative hypothesis.
`beta`	Parameter for the analysis beta prior under the alternative hypothesis.
`location`	Null proportion value.
`scale`	Scale parameter for the analysis prior (if applicable, e.g., for Moment prior).
`model`	Statistical model of the analysis prior under the alternative hypothesis: beta prior (`"beta"`) or Moment prior (`"Moment"`).
`hypothesis`	The hypothesis being tested: two-sided (`"!="`), right-sided (`">"`), or left-sided (`"<"`).
`e`	Optional numeric vector specifying bounds for an interval null; used if interval BF is calculated.

Value

The Bayes factor (BF10) for the one-proportion test.

Examples

```
BF10.bin.test(
  x = 12,
  n = 50,
  alpha = 2,
  beta = 3,
  location = 0.5,
  scale = 1,
  model = "beta",
  hypothesis = "!="
)
```

BF10.cor *Bayes factor for a Bayesian correlation test*

Description

Calculate the Bayes factor (BF10) for a correlation, either against a point null or an interval null hypothesis.

Usage

```
BF10.cor(
  r,
  n,
  k,
  alpha,
  beta,
  h0,
  hypothesis,
  location,
  scale,
  dff,
  model,
  e = NULL
)
```

Arguments

r	Observed correlation coefficient.
n	Sample size.
k	Parameter for the analysis default beta prior under the alternative hypothesis.
alpha	Parameter for the analysis beta prior under the alternative hypothesis.
beta	Parameter for the analysis beta prior under the alternative hypothesis.
h0	Null value of the correlation.
hypothesis	The hypothesis being tested: two-sided ("!="), right-sided (">"), or left-sided ("<").
location	Location parameter for the analysis prior under the alternative hypothesis.
scale	Scale parameter for the analysis normal moment prior under the alternative hypothesis.
dff	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
model	Statistical model of the analysis prior under the alternative hypothesis: default beta ("d_beta"), beta ("beta"), or normal moment ("NLP").
e	Optional numeric vector specifying bounds for an interval null; used if interval BF is calculated.

Value

The Bayes factor (BF10) for the correlation test.

Examples

```
BF10.cor(
  r = 0.3,
  n = 50,
  k = 1,
  alpha = 0.05,
  beta = 0.2,
  h0 = 0,
  hypothesis = "!=",
  location = 0,
  scale = 1,
  dff = 49,
  model = "d_beta"
)
```

BF10.f.test *Bayes factor for a Bayesian F-test*

Description

Calculate the Bayes factor (BF10) for an F-test, either against a point null or an interval null hypothesis.

Usage

```
BF10.f.test(fval, df1, df2, dff, rscale, f_m, model, e = NULL)
```

Arguments

fval	Observed F-value from the F-test.
df1	Degrees of freedom for the numerator of the F-test.
df2	Degrees of freedom for the denominator of the F-test.
dff	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
rscale	Scaling parameter for the analysis effect size prior.
f_m	Cohen's f effect size parameter for the analysis prior.
model	Statistical model of the analysis prior under the alternative hypothesis: effect size prior ("effectsize") or Moment prior ("Moment").
e	Optional numeric vector specifying bounds for an interval null; used if interval BF is calculated.

Value

The Bayes factor (BF10) for the F-test.

Examples

```
BF10.f.test(
  fval = 4.5,
  df1 = 2,
  df2 = 12,
  dff = 12,
  rscale = 0.707,
  f_m = .1,
  model = "effectsize"
)
```

BF10.props *Bayes factor for a Bayesian test of two proportions*

Description

Calculate the Bayes factor (BF10) for comparing two proportions using a Bayesian framework.

Usage

```
BF10.props(a0, b0, a1, b1, a2, b2, n1, n2, x1, x2)
```

Arguments

a0	Alpha parameter of the beta distribution under the null hypothesis.
b0	Beta parameter of the beta distribution under the null hypothesis.
a1	Alpha parameter of the analysis beta prior distribution for group 1 under the alternative hypothesis.
b1	Beta parameter of the analysis beta prior distribution for group 1 under the alternative hypothesis.
a2	Alpha parameter of the analysis beta prior distribution for group 2 under the alternative hypothesis.
b2	Beta parameter of the analysis beta prior distribution for group 2 under the alternative hypothesis.
n1	Sample size for group 1.
n2	Sample size for group 2.
x1	Observed number of successes for group 1.
x2	Observed number of successes for group 2.

Value

The Bayes factor (BF10) for comparing two proportions.

Examples

```
BF10.props(
  a0 = 2, b0 = 3,
  a1 = 2, b1 = 3,
  a2 = 2, b2 = 3,
  n1 = 50, n2 = 60,
  x1 = 25, x2 = 30
)
```

BF10.t.test.one_sample

Bayes factor for one-sample Bayesian t-test

Description

Calculate the Bayes factor (BF10) for a one-sample Bayesian t-test, either against a point null or an interval null hypothesis.

Usage

```
BF10.t.test.one_sample(
  tval,
  df,
  model,
  location,
  scale,
  dff,
  hypothesis,
  e = NULL
)
```

Arguments

`tval`	Observed t-value from the one-sample t-test.
`df`	Degrees of freedom for the t-test.
`model`	Statistical model of the analysis prior under the alternative hypothesis: Normal distribution (`"Normal"`), Normal moment (`"NLP"`), or scaled t (`"t-distribution"`).
`location`	Location parameter for the analysis prior under the alternative hypothesis.
`scale`	Scale parameter for the analysis prior under the alternative hypothesis.
`dff`	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
`hypothesis`	The hypothesis being tested: two-sided (`"!="`), right-sided (`">"`), or left-sided (`"<"`).
`e`	Optional numeric vector specifying bounds for an interval null; used if interval BF is calculated.

Value

The Bayes factor (BF10) for the one-sample t-test.

Examples

```
BF10.t.test.one_sample(
  tval = 2.31,
  df = 29,
  model = "t-distribution",
  location = 0,
  scale = 0.707,
  dff = 1,
  hypothesis = "!="
)
```

BF10.t.test.two_sample

Bayes factor for two-sample Bayesian t-test

Description

Calculate the Bayes factor (BF10) for a two-sample Bayesian t-test, either against a point null or an interval null hypothesis.

Usage

```
BF10.t.test.two_sample(
  tval,
  N1,
  N2,
  model,
  location,
  scale,
  dff,
  hypothesis,
  e = NULL
)
```

Arguments

`tval`	Observed t-value from the two-sample t-test.
`N1`	Sample size of group 1.
`N2`	Sample size of group 2.
`model`	Statistical model of the analysis prior under the alternative hypothesis: Normal distribution (`"Normal"`), Normal moment (`"NLP"`), or scaled t (`"t-distribution"`).
`location`	Location parameter for the analysis prior under the alternative hypothesis.

scale	Scale parameter for the analysis prior under the alternative hypothesis.
dff	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
hypothesis	The hypothesis being tested: two-sided ("!="), right-sided (">"), or left-sided ("<").
e	Optional numeric vector specifying bounds for an interval null; used if interval BF is calculated.

Value

The Bayes factor (BF10) for the two-sample t-test.

Examples

```
BF10.t.test.two_sample(
  tval = 2.1,
  N1 = 30,
  N2 = 30,
  model = "t-distribution",
  location = 0,
  scale = 0.707,
  dff = 1,
  hypothesis = "!="
)
```

BFpower.bin *Sample size determination for Bayesian one-proportion test*

Description

Perform sample size determination or the calculation of compelling and misleading evidence for a Bayesian test of a single proportion.

Usage

```
BFpower.bin(
  hypothesis = NULL,
  interval = NULL,
  D = NULL,
  target = NULL,
  FP = NULL,
  location = NULL,
  model = NULL,
  alpha = NULL,
  beta = NULL,
  scale = NULL,
  model_d = NULL,
```

```
  alpha_d = NULL,
  beta_d = NULL,
  location_d = NULL,
  scale_d = NULL,
  de_an_prior = NULL,
  N = NULL,
  mode_bf = NULL,
  e = NULL,
  direct = NULL,
  h0 = NULL
)
```

Arguments

hypothesis	The hypothesis being tested (e.g., two-sided "!=", right-sided ">", left-sided "<").
interval	Character or integer (0 or 1). If "1", Bayes factor with a point null against a composite alternative hypothesis; otherwise Bayes factor with interval null and alternative hypotheses.
D	The bound of compelling evidence.
target	The targeted true positive rate (if direct = "h1") or true negative rate (if direct = "h0").
FP	The targeted false positive rate (if direct = "h1") or false negative rate (if direct = "h0").
location	Null proportion value.
model	Statistical model of the analysis prior under the alternative hypothesis: beta prior ("beta") or Moment prior ("Moment")
alpha	Parameter for the analysis prior under the alternative hypothesis.
beta	Parameter for the analysis prior under the alternative hypothesis.
scale	Scale parameter for the analysis prior under the alternative hypothesis.
model_d	Statistical model of the design prior under the alternative hypothesis:beta prior ("beta") , Moment prior ("Moment"), or Point prior ("Point")
alpha_d	Parameter for the design prior under the alternative hypothesis.
beta_d	Parameter for the design prior under the alternative hypothesis.
location_d	The proportion value for the design point prior.
scale_d	Scale parameter for the design prior under the alternative hypothesis.
de_an_prior	Integer (0 or 1). If 1, analysis and design priors under the alternative are the same; if 0, they are not.
N	Sample size.
mode_bf	Integer (0 or 1). If 1, sample size determination; if 2, N is needed for the calculation of probabilities of compelling and misleading evidence.
e	The bounds for the interval Bayes factor (used when interval = 0).
direct	If "h1", BF10; if "h0", BF01.
h0	Null value

Value

A data frame with the following columns:

- `p(BF10 > D | H1)`: Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- `p(BF01 > D | H1)`: Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- `p(BF01 > D | H0)`: Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.
- `p(BF10 > D | H0)`: Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- `Required N`: The required sample size or the sample size input by the users.

If sample size determination fails, the function returns `NULL`.

Examples

```
BFpower.bin(
  hypothesis = "!=",
  interval = "1",
  D = 3,
  target = 0.8,
  FP = 0.05,
  location = 0.5,
  model = "beta",
  alpha = 1,
  beta = 1,
  de_an_prior = 1,
  mode_bf = 1,
  direct = "h1"
)
```

`BFpower.cor` *Sample size determination for Bayesian correlation test*

Description

Perform sample size determination or the calculation of compelling and misleading evidence for a Bayesian correlation test.

Usage

```
BFpower.cor(
  hypothesis = NULL,
  h0 = NULL,
  e = NULL,
```

```
  interval = NULL,
  D = NULL,
  target = NULL,
  FP = NULL,
  model = NULL,
  k = NULL,
  alpha = NULL,
  beta = NULL,
  scale = NULL,
  model_d = NULL,
  alpha_d = NULL,
  beta_d = NULL,
  location_d = NULL,
  k_d = NULL,
  scale_d = NULL,
  de_an_prior = NULL,
  N = NULL,
  mode_bf = NULL,
  direct = NULL
)
```

Arguments

hypothesis	The hypothesis being tested (e.g., two-sided "!=", right-sided ">", left-sided "<").
h0	Null value of the correlation.
e	The bounds for the interval Bayes factor (used when interval = 0).
interval	Character or integer (0 or 1). If "1", Bayes factor with a point null against a composite alternative hypothesis; otherwise Bayes factor with interval null and alternative hypotheses.
D	The bound of compelling evidence.
target	The targeted true positive rate (if direct = "h1") or true negative rate (if direct = "h0").
FP	The targeted false positive rate (if direct = "h1") or false negative rate (if direct = "h0").
model	Statistical model of the analysis prior under the alternative hypothesis: default beta ("d_beta"), beta ("beta"), or normal moment ("NLP")
k	Parameter for the analysis default beta prior under the alternative hypothesis.
alpha	Parameter for the analysis beta prior under the alternative hypothesis.
beta	Parameter for the analysis beta prior under the alternative hypothesis.
scale	Scale parameter for the analysis normal moment prior under the alternative hypothesis.
model_d	Statistical model of the design prior under the alternative hypothesis:default beta ("d_beta"), beta ("beta"), normal moment ("NLP" , or point "Point")
alpha_d	Parameter for the design beta prior under the alternative hypothesis.

beta_d	Parameter for the design beta prior under the alternative hypothesis.
location_d	Location parameter for the design point prior under the alternative hypothesis.
k_d	Parameter for the design default beta prior under the alternative hypothesis.
scale_d	Scale parameter for the design normal moment prior under the alternative hypothesis.
de_an_prior	Integer (0 or 1). If 1, analysis and design priors under the alternative are the same; if 0, they are not.
N	Sample size.
mode_bf	Integer (0 or 1). If 1, sample size determination; if 2, N is needed for the calculation of probabilities of compelling and misleading evidence.
direct	If "h1", BF10; if "h0", BF01.

Value

A data frame with the following columns:

- p(BF10 > D | H1): Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- p(BF01 > D | H1): Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- p(BF01 > D | H0): Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.
- p(BF10 > D | H0): Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- Required N: The required sample size or the sample size input by the users.

If sample size determination fails, the function returns NULL.

Examples

```
BFpower.cor(
  hypothesis = "!=",
  h0 = 0,
  e = NULL,
  interval = "1",
  D = 3,
  target = 0.8,
  FP = 0.05,
  model = "d_beta",
  k = 1,
  de_an_prior = 1,
  mode_bf = 1,
  direct = "h1"
)
```

BFpower.f *Sample size determination for Bayesian F-test*

Description

Perform sample size determination or the calculation of compelling and misleading evidence for a Bayesian F-test.

Usage

```
BFpower.f(
  interval = NULL,
  D = NULL,
  target = NULL,
  FP = NULL,
  p = NULL,
  k = NULL,
  model = NULL,
  dff = NULL,
  rscale = NULL,
  f_m = NULL,
  model_d = NULL,
  dff_d = NULL,
  rscale_d = NULL,
  f_m_d = NULL,
  de_an_prior = NULL,
  N = NULL,
  mode_bf = NULL,
  direct = NULL,
  e = NULL
)
```

Arguments

interval	Character or integer (0 or 1). If "1", Bayes factor with a point null against a composite alternative hypothesis; otherwise Bayes factor with interval null and alternative hypotheses.
D	The bound of compelling evidence.
target	The targeted true positive rate (if direct = "h1") or true negative rate (if direct = "h0").
FP	The targeted false positive rate (if direct = "h1") or false negative rate (if direct = "h0").
p	Number of predictors in the reduced model.
k	Number of predictors in the full model.

model	Statistical model of the analysis prior under the alternative hypothesis: effect size prior ("effectsize") or Moment prior ("Moment")
dff	Degrees of freedom for the analysis prior under the alternative hypothesis.(must be >3 if moment prior is used)
rscale	Scaling parameter for the analysis effect size prior.
f_m	Cohen's f effect size parameter for the analysis prior.
model_d	Statistical model of the design prior under the alternative hypothesis:: effect size prior ("effectsize"), Moment prior ("Moment"), or Point prior ("Point")
dff_d	Degrees of freedom for the design prior under the alternative hypothesis. (must be >3 if moment prior is used)
rscale_d	Scaling parameter for the design effect size prior.
f_m_d	Cohen's f effect size parameter for the design prior or the point design prior.
de_an_prior	Integer (0 or 1). If 1, analysis and design priors under the alternative are the same; if 0, they are not.
N	Sample size.
mode_bf	Integer (0 or 1). If 1, sample size determination; if 2, N is needed for the calculation of probabilities of compelling and misleading evidence.
direct	If "h1", BF10; if "h0", BF01.
e	The bounds for the interval Bayes factor (used when interval = 0).

Value

A data frame with the following columns:

- p(BF10 > D | H1): Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- p(BF01 > D | H1): Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- p(BF01 > D | H0): Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.
- p(BF10 > D | H0): Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- Required N: The required sample size or the sample size input by the users.

If sample size determination fails, the function returns NULL.

Examples

```
BFpower.f(
 inter = "1",
 D = 3,
 target = 0.8,
 p = 1,
 k = 2,
 model = "Moment",
```

```
 dff = 1,
 f_m = 0.1,
 de_an_prior = 1,
 mode_bf = 1,
 direct = "h1"
)
```

`BFpower.props` *Sample size determination for Bayesian test of two proportions*

Description

Perform sample size determination or the calculation of compelling and misleading evidence for a Bayesian comparison of two proportions.

Usage

```
BFpower.props(
  D = NULL,
  target = NULL,
  a0 = NULL,
  b0 = NULL,
  a1 = NULL,
  b1 = NULL,
  a2 = NULL,
  b2 = NULL,
  model1 = NULL,
  a1d = NULL,
  b1d = NULL,
  dp1 = NULL,
  model2 = NULL,
  a2d = NULL,
  b2d = NULL,
  dp2 = NULL,
  mode_bf = NULL,
  n1 = NULL,
  n2 = NULL,
  direct = NULL
)
```

Arguments

`D`	The bound of compelling evidence.
`target`	The targeted true positive rate (if `direct = "h1"`) or true negative rate (if `direct = "h0"`).
`a0`	Alpha parameter of the beta distribution under the null .

b0	Beta parameter of the beta distribution under the null.
a1	Alpha parameter of the analysis beta prior distribution for group 1 under the alternative hypothesis.
b1	Beta parameter of the analysis beta prior distribution for group 1 under the alternative hypothesis.
a2	Alpha parameter of the analysis beta prior distribution for group 2 under the alternative hypothesis.
b2	Beta parameter of the analysis beta prior distribution for group 2 under the alternative hypothesis.
model1	Statistical model of the design prior for group 1: beta ("beta"), Point prior ("Point", or same as analysis prior "same")
a1d	Alpha parameter for the design prior of group 1.
b1d	Beta parameter for the design prior of group 1.
dp1	True proportion for group 1 in the design prior.
model2	Statistical model of the design prior for group 1: beta ("beta"), or Point prior ("Point", or same as analysis prior "same")
a2d	Alpha parameter for the design prior of group 2.
b2d	Beta parameter for the design prior of group 2.
dp2	True proportion for group 2 in the design prior.
mode_bf	Integer (0 or 1). If 1, sample size determination; if 2, n1 and n2 are used for the calculation of probabilities of compelling and misleading evidence.
n1	Sample size for group 1.
n2	Sample size for group 2.
direct	If "h1", BF10; if "h0", BF01.

Value

A data frame with the following columns:

- p(BF10 > D | H1): Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- p(BF01 > D | H1): Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- p(BF01 > D | H0): Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.
- p(BF10 > D | H0): Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- Required N1: The required sample size for group 1 or the sample size input by the user.
- Required N2: The required sample size for group 1 or the sample size input by the user.

If sample size determination fails, the function returns NULL.

Examples

```
BFpower.props(
  D = 3,
  target = 0.8,
  a0 = 1,
  b0 = 1,
  model1 = "same",
  a1 = 1,
  b1 = 1,
  a2 = 1,
  b2 = 1,
  model2 = "same",
  mode_bf = 1,
  direct = "h1"
)
```

BFpower.t.test_one_sample

Sample size determination for one-sample Bayesian t-test

Description

Perform sample size determination or the calculation of compelling and misleading evidence.

Usage

```
BFpower.t.test_one_sample(
  hypothesis = NULL,
  e = NULL,
  interval = NULL,
  D = NULL,
  target = NULL,
  alpha = NULL,
  model = NULL,
  location = NULL,
  scale = NULL,
  dff = NULL,
  model_d = NULL,
  location_d = NULL,
  scale_d = NULL,
  dff_d = NULL,
  de_an_prior = NULL,
  N = NULL,
  mode_bf = NULL,
  direct = NULL
)
```

Arguments

hypothesis	The hypothesis being tested (e.g., two-sided "!=", right-sided ">", left-sided "<").
e	The bounds for the interval Bayes factor (used when interval = 0).
interval	Integer (1 or 0). If 1, Bayes factor with a point null against a composite alternative hypothesis; otherwise Bayes factor with interval null and alternative hypotheses.
D	The bound of compelling evidence.
target	The targeted true positive rate (if direct = "h1") or true negative rate (if direct = "h0").
alpha	The targeted false positive rate (if direct = "h1") or false negative rate (if direct = "h0").
model	Statistical model of the analysis prior under the alternative hypothesis: Normal distribution ("Normal"), Normal moment ("NLP"), or scaled t ("t-distribution").
location	Location parameter for the analysis prior under the alternative hypothesis.
scale	Scale parameter for the analysis prior under the alternative hypothesis.
dff	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
model_d	Statistical model of the design prior under the alternative hypothesis: Normal distribution ("Normal"), Normal moment ("NLP"), or scaled t ("t-distribution").
location_d	Location parameter for the design prior under the alternative hypothesis.
scale_d	Scale parameter for the design prior under the alternative hypothesis.
dff_d	Degrees of freedom parameter for the design prior under the alternative hypothesis.
de_an_prior	Integer (0 or 1). If 1, analysis and design priors under the alternative are the same; if 0, they are not.
N	Sample size.
mode_bf	Integer (1 or 2). If 1, sample size determination; if 2, N is used for the calculation of probabilities of compelling and misleading evidence.
direct	If "h1", controlling true/false positive rates; if "h0", controlling true/false negative rates.

Value

A data frame with the following columns:

- p(BF10 > D | H1): Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- p(BF01 > D | H1): Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- p(BF01 > D | H0): Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.

- p(BF10 > D | H0): Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- Required N: The required sample size or the sample size input by the users.

If sample size determination fails, the function returns NULL.

Examples

```
BFpower.t.test_one_sample(
  hypothesis = "!=",
  interval = 1,
  D = 3,
  target = 0.8,
  alpha = 0.05,
  model = "t-distribution",
  location = 0,
  scale = 0.707,
  dff = 1,
  de_an_prior = 1,
  N = NULL,
  mode_bf = 1,
  direct = "h1"
)
```

BFpower.t.test_two_sample

Sample size determination for two-sample Bayesian t-test

Description

Perform sample size determination or the calculation of compelling and misleading evidence for a two-sample Bayesian t-test.

Usage

```
BFpower.t.test_two_sample(
  hypothesis = NULL,
  e = NULL,
  interval = NULL,
  D = NULL,
  target = NULL,
  alpha = NULL,
  model = NULL,
  location = NULL,
  scale = NULL,
  dff = NULL,
  model_d = NULL,
```

```
  location_d = NULL,
  scale_d = NULL,
  dff_d = NULL,
  de_an_prior = NULL,
  N1 = NULL,
  N2 = NULL,
  r = NULL,
  mode_bf = NULL,
  direct = NULL
)
```

Arguments

hypothesis	The hypothesis being tested (e.g., two-sided "!=", right-sided ">", left-sided "<").
e	The bounds for the interval Bayes factor (used when interval = 0).
interval	Integer (1 or 0). If 1, Bayes factor with a point null against a composite alternative hypothesis; otherwise Bayes factor with interval null and alternative hypotheses.
D	The bound of compelling evidence.
target	The targeted true positive rate (if direct = "h1") or true negative rate (if direct = "h0").
alpha	The targeted false positive rate (if direct = "h1") or false negative rate (if direct = "h0").
model	Statistical model of the analysis prior under the alternative hypothesis: Normal distribution ("Normal"), Normal moment ("NLP"), or scaled t ("t-distribution").
location	Location parameter for the analysis prior under the alternative hypothesis.
scale	Scale parameter for the analysis prior under the alternative hypothesis.
dff	Degrees of freedom for the analysis prior under the alternative hypothesis (if applicable).
model_d	Statistical model of the design prior under the alternative hypothesis: Normal distribution ("Normal"), Normal moment ("NLP"), or scaled t ("t-distribution").
location_d	Location parameter for the design prior under the alternative hypothesis.
scale_d	Scale parameter for the design prior under the alternative hypothesis.
dff_d	Degrees of freedom parameter for the design prior under the alternative hypothesis.
de_an_prior	Integer (0 or 1). If 1, analysis and design priors under the alternative are the same; if 0, they are not.
N1	Sample size of group 1.
N2	Sample size of group 2.
r	Ratio of the sample size of group 2 over group 1 (N2 / N1).
mode_bf	Integer (1 or 0). If 1, sample size determination; if 0, N1 and N2 are used for the calculation of probabilities of compelling and misleading evidence.
direct	If "h1", controls true/false positive rates (BF10); if "h0", controls true/false negative rates (BF01).

Value

A data frame with the following columns:

- `p(BF10 > D | H1)`: Probability of obtaining compelling evidence in favor of the alternative hypothesis when the alternative is true.
- `p(BF01 > D | H1)`: Probability of obtaining misleading evidence in favor of the null hypothesis when the alternative is true.
- `p(BF01 > D | H0)`: Probability of obtaining compelling evidence in favor of the null hypothesis when the null is true.
- `p(BF10 > D | H0)`: Probability of obtaining misleading evidence in favor of the alternative hypothesis when the null is true.
- `Required N1`: The required sample size for group 1 or the sample size input by the user.
- `Required N2`: The required sample size for group 1 or the sample size input by the user.

If sample size determination fails, the function returns `NULL`.

Examples

```
BFpower.t.test_two_sample(
  hypothesis = "!=",
  e = NULL,
  interval = 1,
  D = 3,
  target = 0.8,
  alpha = 0.05,
  model = "t-distribution",
  location = 0,
  scale = 0.707,
  dff = 1,
  de_an_prior = 1,
  r = 1,
  mode_bf = 1,
  direct = "h1"
)
```

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