

Package

September 13, 2019

Title Calculate Power and Sample Size with Beta Regression

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Description Power calculations are a critical component of any research study to determine the minimum sample size necessary to detect differences between multiple groups. Researchers often work with data taking the form of proportions that can be modeled with a beta distribution. Here we present an R package, BetaPASS, and analogous SAS macro, that perform power and sample size calculations for data following a beta distribution with comparative nonparametric output. This package allows flexibility with multiple options for link functions to fit the data and graphing functionality for visual comparisons.

Depends R (≥ 3.5)

License GPL (≥ 2)

Encoding UTF-8

LazyData true

RoxygenNote 6.1.1

Imports betareg, ggplot2, pbapply, stats

Suggests knitr,
rmarkdown

VignetteBuilder knitr

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betapower	<i>Find Power with Beta distribution</i>
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Description

Find the power for a given sample size when testing the null hypothesis that the means for the control and treatment groups are equal against a two-sided alternative.

Usage

```
betapower(mu0, sd0, mu1.start, mu1.end = NULL, mu1.by = NULL,
ss.start, ss.end = NULL, ss.by = NULL, sig.level = 0.05,
trials = 100, seed = 1, link.type="logit",
equal.precision=TRUE, sd1 = NULL)
```

Arguments

<code>mu0</code>	mean for the control group
<code>sd0</code>	standard deviation for the control group
<code>mu1.start</code>	starting value of mean for the treatment group under the alternative <code>mu1</code>
<code>mu1.end</code>	ending value of mean for the treatment group under the alternative <code>mu1</code>
<code>mu1.by</code>	step length of mean for the treatment group under the alternative <code>mu1</code>
<code>ss.start</code>	starting value of sample size
<code>ss.end</code>	ending value of sample size
<code>ss.by</code>	step length of sample size
<code>sig.level</code>	significant level of test; default value is 0.05
<code>trials</code>	number of trials
<code>seed</code>	seed used in the simulation
<code>link.type</code>	type of link used in the beta regression. Default value is "logit", or you can use "all" or choose one or more of the following: "logit", "probit", "cloglog", "cauchit", "log", "loglog"
<code>equal.precision</code>	equal dispersion parameter assumption in simulation
<code>sd1</code>	standard deviation for the treatment group. Only applicable when <code>equal.precision = FALSE</code>

Details

betapower function allows you to control the number of trials in the simulation, the sample sizes used, and the alternative means. You can fix the alternative and vary sample size to match a desired power; You can fix the sample size and vary the alternative to see which will match a desired power; You can vary both; Start with a small number of trials (say 100) to determine the rough range of sample sizes or alternatives; Use a larger number of trials (say 1000) to get better estimates.

Value

Return a betapower object including basic settings (mean and standard deviation for the control group, significant level, number of trials and link types), and a matrix of estimated power with given sample size and `mu1`.

<code>power.of.GLM: link name</code>	estimated power using beta regression method; it will return the power with every links if you use <code>link.type = "all"</code> statement.
<code>power.of.Wilcoxon.test</code>	estimated power from Wilcoxon Rank sum test.
<code>sample size</code>	sample size.
<code>mu1</code>	mean for the treatment group under the alternative.

Examples

```
betapower(mu0 = 0.56, sd0 = 0.255, mu1.start = .70, mu1.end = .75, mu1.by = .05,
ss.start = 30, ss.end = 50, ss.by = 20, trials = 100)
```

samplesize	<i>Find minimum sample size with Beta distribution</i>
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Description

Find minimum sample sizes with Beta distribution and given mu0,sd0,mu1 and target powers.

Usage

```
samplesize(mu0, sd0, mu1.start, mu1.end = NULL, mu1.by = NULL,
power.start, power.end = NULL, power.by = NULL, sig.level = 0.05,
trials = 100, delta = 1, seed = 1, link.type = "logit",
equal.precision = TRUE, sd1 = NULL)
```

Arguments

mu0	mean for the control group
sd0	standard deviation for the control group
mu1.start	starting value of mean for the treatment group under the alternative mu1
mu1.end	ending value of mean for the treatment group under the alternative mu1
mu1.by	step length of mean for the treatment group under the alternative mu1
power.start	starting value of target power
power.end	ending value of target power
power.by	step length of target power
sig.level	significant level; default value is 0.05
trials	number of trials; default value is 100
delta	accuracy of the result; must be integer
seed	seed used in the simulation
link.type	type of link used in the beta regression. Default link is "logit". Other link options include: "logit", "probit", "cloglog", "log", "loglog", "wilcoxon", or you can use "all" for all types of link
equal.precision	equal dispersion parameter assumption in simulation
sd1	standard deviation for the treatment group. Only applicable when equal.precision = FALSE

Details

The samplesize function allows you to control the number of trials in the simulation, the target power, delta, and the alternative means. You can fix the alternative and vary power to match a desired sample size; Use default values for the number of trials for a quick view; Use a larger number of trials (say 1000) and a smaller delta (say 1) to get better estimates.

Value

Return a samplesize object including basic settings (mean and standard deviation for the control group, significant level, number of trials and link types), and a matrix of estimated power with given mu1 and target power.

minimum sample size: link type:

minimum sample size for given given mu0, sd0, mu1, target power and type of link.

minimum power: link type:

the minimum power greater than or equal to target power.

target power: target power.

mu1: mean for the treatment group under the alternative.

Examples

```
samplesize(mu0=0.56, sd0=0.255, mu1.start = 0.8, power.start = 0.9, trials = 50,  
link.type = c("logit","wilcoxon"))
```

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