Package ‘ph2bayes’

January 18, 2016

Type Package

Title Bayesian Single-Arm Phase II Designs

Version 0.0.1

Author Kengo NAGASHIMA

Maintainer Kengo NAGASHIMA <nshi@chiba-u.jp>

Description An implementation of Bayesian single-arm phase II design methods for binary outcome based on posterior probability and predictive probability.

License GPL-3

Imports stats, Rcpp (>= 0.12.3)

LinkingTo Rcpp

RoxygenNote 5.0.1

NeedsCompilation yes

Repository CRAN

Date/Publication 2016-01-18 07:46:05

R topics documented:

ph2bayes-package ........................................... 2
postprob .................................................. 2
predprob .................................................. 3
stopbound_post ........................................... 4
stopbound_pred ........................................... 5

Index 6
**ph2bayes-package**  
*The ph2bayes package*

**Description**

An implementation of Bayesian single-arm phase II design methods for binary outcome based on posterior probability and predictive probability: Thall and Simon (Biometrics 1994), Lee and Liu (Clinical Trials 2008).

**Author(s)**

Author & Maintainer: Kengo NAGASHIMA <nshi@chiba-u.jp>

---

**postprob**  
*The posterior probability criterion function*

**Description**

Thall and Simon’s criterion function for determining the trial decision cutoffs based on the posterior probability.

**Usage**

```r
postprob(y, n, alpha_e, beta_e, alpha_s, beta_s, delta)
```

**Arguments**

- `y`: the number of responses among `n` patients treated by the experimental drug at a certain stage of the trial.
- `n`: the number of patients treated by the experimental drug at a certain stage of the trial.
- `alpha_e`: the hyperparameter (shape1) of the Beta prior for the experimental drug.
- `beta_e`: the hyperparameter (shape2) of the Beta prior for the experimental drug.
- `alpha_s`: the hyperparameter (shape1) of the Beta prior for the standard drug.
- `beta_s`: the hyperparameter (shape2) of the Beta prior for the standard drug.
- `delta`: the minimally acceptable increment of the response rate for the experimental drug compared with the standard drug.

**Value**

- `prob`: the posterior probability: $\Pr(p_E > p_S + \delta|y)$
References


predprob

The predictive probability criterion function

Description

Lee and Liu’s criterion function for determining the trial decision cutoffs based on the predictive probability.

Usage

def predprob(y, n, nmax, alpha_e, beta_e, p_s, theta_t)

Arguments

y the number of responses among n patients treated by the experimental drug at a certain stage of the trial.
n the number of patients treated by the experimental drug at a certain stage of the trial.
nmax the maximum number of patients treated by the experimental drug.
alpha_e the hyperparameter (shape1) of the Beta prior for the experimental drug.
beta_e the hyperparameter (shape2) of the Beta prior for the experimental drug.
p_s the response rate for the standard drug.
theta_t the prespecified target probability; typically, $\theta_T = [0.85, 0.95]$.

Value

prob the predictive probability:

$$PP = \sum_{x=0}^{n_{max}-n} P(x|y) I(Pr(p_E > p_S|y, x) \geq \theta_T)$$

References


Examples

# p. 97, PP = 0.5656
predprob(16, 23, 40, 0.4, 0.6, 0.6, 0.9)
The stopping boundaries based on Thall and Simon’s criterion

Description

The stopping boundaries based on Thall and Simon’s criterion.

Usage

stopbound_post(theta, type, nmax, alpha_e, beta_e, alpha_s, beta_s, delta)

Arguments

theta    the cutoff probability: typically, \( \theta = [0.95, 0.99] \) for superiority, \( \theta = [0.01, 0.05] \) for futility.
type    type of boundaries: "superiority" or "futility".
nmax    the maximum number of patients treated by the experimental drug.
alpha_e the hyperparameter (shape1) of the Beta prior for the experimental drug.
beta_e  the hyperparameter (shape2) of the Beta prior for the experimental drug.
alpha_s the hyperparameter (shape1) of the Beta prior for the standard drug.
beta_s  the hyperparameter (shape2) of the Beta prior for the standard drug.
delta    the minimally acceptable increment of the response rate for the experimental drug compared with the standard drug. Note: if type = "superiority", then delta is set to 0.

Value

boundset the boundaries set; \( U_n \) or \( L_n \)

References


Examples

stopbound_post(0.05, "futility", 40, 0.6, 1.4, 15, 35, 0)
stopbound_post(0.05, "futility", 30, 0.4, 1.6, 10, 40, 0)
stopbound_post(0.95, "superiority", 40, 0.6, 1.4, 15, 35, 0)
stopbound_pred

The stopping boundaries based on Lee and Liu’s criterion

Description

The stopping boundaries based on Lee and Liu’s criterion.

Usage

stopbound_pred(theta, type, nmax, alpha_e, beta_e, p_s, theta_t)

Arguments

theta the cutoff probability: typically, $\theta = [0.95, 0.99]$ for superiority, $\theta = [0.01, 0.05]$ for futility.
type type of boundaries: "superiority" or "futility".
nmax the maximum number of patients treated by the experimental drug.
alpha_e the hyperparameter (shape1) of the Beta prior for the experimental drug.
beta_e the hyperparameter (shape2) of the Beta prior for the experimental drug.
p_s the the response rate for the standard drug.
theta_t the prespecified target probability; typically, $\theta_T = [0.85, 0.95]$.

Value

boundset the boundaries set: $U_n$ or $L_n$

References


Examples

stopbound_pred(0.05, "futility", 40, 0.6, 1.4, 0.3, 0.85)
stopbound_pred(0.05, "futility", 30, 0.4, 1.6, 0.2, 0.85)
stopbound_pred(0.95, "superiority", 40, 0.6, 1.4, 0.3, 0.85)
Index

*Topic design
  ph2bayes-package, 2
*Topic htest
  ph2bayes-package, 2
*Topic package
  ph2bayes-package, 2

ph2bayes (ph2bayes-package), 2
ph2bayes-package, 2
postprob, 2
predprob, 3

stopbound_post, 4
stopbound_pred, 5