Package ‘ph2bayes’

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Type Package

Title Bayesian Single-Arm Phase II Designs

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License GPL-3

Imports stats, Rcpp (>= 0.12.15)

LinkingTo Rcpp

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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).

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
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 + δ | 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

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 the response rate for the standard drug.
theta_t    the prespecified target probability; tipically, $\theta_T = [0.85, 0.95]$.

Value

prob       the predictive probability: $PP = \sum_{x=0}^{n_{max}} P(x|y) I(Pr(p_E > p_S | y, x) \geq \theta_T)$

References


Examples

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

Usage

```r
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 response rate for the standard drug.
- `theta_t`: the prespecified target probability; typically, \( \theta_T = [0.85, 0.95] \).

Value

```r
boundset
```

the boundaries set: \( U_n \) or \( L_n \)

References


Examples

```r
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)
```
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