# Package: frequentistSSDBinary (via r-universe)

September 25, 2024

**Type** Package

**Title** Screened Selection Design with Binary Endpoints

**Version** 0.1.0

**Maintainer** Chia-Wei Hsu <Chia-Wei.Hsu@stjude.org>

**Description** A study based on the screened selection design (SSD) is an exploratory phase II randomized trial with two or more arms but without concurrent control. The primary aim of the SSD trial is to pick a desirable treatment arm (e.g., in terms of the response rate) to recommend to the subsequent randomized phase IIb (with the concurrent control) or phase III. The proposed designs can "partially" control or provide the empirical type I error/false positive rate by an optimal algorithm (implemented by the optimal_2arm_binary() or optimal_3arm_binary() function) for each arm. All the design needed components (sample size, operating characteristics) are supported.

**License** GPL-2

**Encoding** UTF-8

**Depends** mvtnorm, clinfun, ph2mult

**NeedsCompilation** no

**Author** Chia-Wei Hsu [aut, cre], Zongheng Cai [aut], Haitao Pan [aut]

**Repository** CRAN

**Date/Publication** 2024-06-26 13:00:06 UTC

## Contents

---

`get_oc_2arm_binary` *Generate operating characteristics for Two-Stage Screened Selection Design for Randomized Phase II Trials with Binary Endpoints*

---

## Description

Obtain the operating characteristics of Two-Stage Screened Selection Design for Randomized Phase II Trials with Binary Endpoints. The arguments for this function are from outputs of the functions of `sample_size_2arm_binary()` and `optimal_2arm_binary()`

## Usage

```
get_oc_2arm_binary(r1, r2, n1, n, p0, p1, p2, diff = 0, nsim, seed = 2483)
```

## Arguments

| | |
|---|---|
| `r1` | the maximum number of successes in stage 1 which will terminate trial |
| `r2` | the maximum number of successes in stage 2 not to warrant further investigation |
| `n1` | the number of subjects in stage 1 |
| `n` | the total number of subjects (stage 1 + stage 2) |
| `p0` | the response rate of historical data |
| `p1` | the response rate of arm 1 |
| `p2` | the response rate of arm 2 |
| `diff` | the equivalence margin |
| `nsim` | the number of simulated trials |
| `seed` | the seed. The default value is seed = 2483 |

## Value

`get_oc_2arm_binary()` returns: (1) n: total sample size for each arm (2) SSD.Arm.A: selection probability of Arm A (3) SSD.Arm.B: selection probability of Arm B (4) SSD.No.Arm: the probability of no arms selected (5) diff: the equivalence margin (6) Mean.N.Arm.A: the average number of patients allocated to Arm A (7) Mean.N.Arm.B: the average number of patients allocated to Arm B

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
get_oc_2arm_binary(r1 = 2, r2 = 6, n1 = 11, n = 21, p0 = 0.2,
                   p1 = 0.415, p2 = 0.615, nsim = 100)
```

---

# get_oc_3arm_binary *Generate operating characteristics for Two-Stage Screened Selection Design for Randomized Phase II Trials with Binary Endpoints for 3 arms*

---

## Description

Obtain the operating characteristics of Two-Stage Screened Selection Design for Randomized Phase II Trials with Binary Endpoints for 3 arms. The arguments for this function are from outputs of the functions of `sample_size_3arm_binary()` and `optimal_3arm_binary()`

## Usage

```
get_oc_3arm_binary(r1, r2, n1, n, p0, p1, p2, p3, diff = 0, nsim, seed = 2483)
```

## Arguments

| | |
|---|---|
| `r1` | the maximum number of successes in stage 1 which will terminate trial |
| `r2` | the maximum number of successes in stage 2 not to warrant further investigation |
| `n1` | the number of subjects in stage 1 |
| `n` | the total number of subjects (stage 1 + stage 2) |
| `p0` | the response rate of historical data |
| `p1` | the response rate of arm 1 |
| `p2` | the response rate of arm 2 |
| `p3` | the response rate of arm 3 |
| `diff` | the equivalence margin. The default value is diff = 0 |
| `nsim` | the number of simulated trials |
| `seed` | the seed. The default value is seed = 2483 |

## Value

`get_oc_3arm_binary()` returns: (1) n: total sample size for each arm (2) SSD.Arm.A: selection probability of Arm A (3) SSD.Arm.B: selection probability of Arm B (4) SSD.Arm.C: selection probability of Arm C (5) SSD.No.Arm: the probability of no arms selected (6) diff: the equivalence margin (7) Mean.N.Arm.A: the average number of patients allocated to Arm A (8) Mean.N.Arm.B: the average number of patients allocated to Arm B (9) Mean.N.Arm.C: the average number of patients allocated to Arm C

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
get_oc_3arm_binary(r1 = 4, r2 = 25, n1 = 15, n = 82,
                   p0 = 0.2, p1 = 0.415, p2 = 0.515,
                   p3 = 0.615, nsim = 100)
```

---

# optimal_2arm_binary *Find optimal design parameters*

---

## Description

Find the optimal parameters used in the `get_oc_2arm()` function

## Usage

```
optimal_2arm_binary(p0, p1, p2, alpha = 0.1, beta = 0.2, tot_sample)
```

## Arguments

| | |
|---|---|
| `p0` | the response rate of historical data |
| `p1` | the response rate of arm 1 |
| `p2` | the response rate of arm 2 |
| `alpha` | the type I error to be controlled. The default value is alpha = 0.1 |
| `beta` | the type II error to be controlled. The default value is beta = 0.2 |
| `tot_sample` | the required sample size for each arm from function `sample_size_2arm_binary()` |

## Value

`optimal_2arm_binary()` returns: (1) alpha: type I error (2) beta: typeII error (3) r1: the maximum number of successes in stage 1 which will terminate trial (4) n1: the number of subjects in stage 1 (5) r2: the maximum number of successes in stage 2 not to warrant further investigation (6) n: the total number of subjects (stage 1 + stage 2) (7) ESS: the expected sample size for each arm (8) PS:the probability of early stopping

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
optimal_2arm_binary(p0 = 0.2, p1 = 0.415, p2 = 0.615, tot_sample = 21)
```

---

# optimal_3arm_binary *Find optimal design parameters*

---

## Description

Find the optimal parameters used in the `get_oc_3arm_binary()` function

## Usage

```
optimal_3arm_binary(p0, p1, p2, p3, alpha = 0.1, beta = 0.2, tot_sample)
```

## Arguments

| | |
|---|---|
| `p0` | the response rate of historical data |
| `p1` | the response rate of arm 1 |
| `p2` | the response rate of arm 2 |
| `p3` | the response rate of arm 3 |
| `alpha` | the type I error to be controlled. The default value is alpha = 0.1 |
| `beta` | the type II error to be controlled. The default value is beta = 0.2 |
| `tot_sample` | the required sample size for each arm from function `sample_size_3arm_binary()` |

## Value

`optimal_3arm_binary()` returns: (1) alpha: type I error (2) beta: typeII error (3) r1: the maximum number of successes in stage 1 which will terminate trial (4) n1: the number of subjects in stage 1 (5) r2: the maximum number of successes in stage 2 not to warrant further investigation (6) n: the total number of subjects (stage 1 + stage 2) (7) ESS: the expected sample size for each arm (8) PS:the probability of early stopping

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
optimal_3arm_binary(p0 = 0.2, p1 = 0.415, p2 = 0.515, p3 = 0.615,
                    alpha = 0.1, beta = 0.2, tot_sample = 82)
```

---

# sample_size_2arm_binary

*Calculate the sample size for each arm in a two-arm trial*

---

## Description

Calculate the sample size for each arm in a two-arm trial

## Usage

```
sample_size_2arm_binary(p0, p1, p2, diff = 0, selection.prob = 0.9,
                        alpha = 0.1, beta = 0.2)
```

## Arguments

| | |
|---|---|
| `p0` | the successful probability of historical data |
| `p1` | the response rate of arm 1 |
| `p2` | the response rate of arm 2 |
| `diff` | the equivalence margin |

| | |
|---|---|
| selection.prob | the probability of selection of a superior arm. The default value is selection.prob = 0.9 |
| alpha | the type I error to be controlled. The default value is alpha = 0.1 |
| beta | the type II error to be controlled. The default value is beta = 0.2 |

## Value

sample_size_2arm_binary() returns required sample size for each arm

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
sample_size_2arm_binary(p0 = 0.2, p1 = 0.415, p2 = 0.615)
```

---

# sample_size_3arm_binary

*Calculate the sample size for each arm in a three-arm study*

---

## Description

Calculate the sample size for each arm in a three-arm trial

## Usage

```
sample_size_3arm_binary(p0, p1, p2, p3, diff = 0, selection.prob = 0.9, alpha = 0.1,
                beta = 0.2)
```

## Arguments

| | |
|---|---|
| p0 | the response rate of historical control arm |
| p1 | the response rate of arm 1 |
| p2 | the response rate of arm 2 |
| p3 | the response rate of arm 3 |
| diff | the equivalence margin. The default value is diff = 0 |
| selection.prob | the probability of selection of a superior arm. The default value is selection.prob = 0.9 |
| alpha | the type I error to be controlled. The default value is alpha = 0.1 |
| beta | the type II error to be controlled. The default value is beta = 0.2 |

## Value

`sample_size_3arm_binary()` returns required sample size for each arm

## Author(s)

Chia-Wei Hsu, Zongheng Cai, Haitao Pan

## References

Cai, Z., Pan, H., Wu, J., Hsu, C.W. (2024). Uncontrolled Randomized Screening Selection Design for Pediatric Oncology Trials. Accepted in Book Chapter of "Master Protocol Clinical Trial for Efficient Evidence Generation"

Wu, J., Pan, H., & Hsu, C. W. (2022). Two-stage screened selection designs for randomized phase II trials with time-to-event endpoints. Biometrical Journal, 64(7), 1207-1218

Yap, C., Pettitt, A. & Billingham, L. Screened selection design for randomised phase II oncology trials: an example in chronic lymphocytic leukaemia. BMC Med Res Methodol 13, 87 (2013)

## Examples

```
sample_size_3arm_binary(p0 = 0.2, p1 = 0.415, p2 = 0.515, p3 = 0.615)
```

# Index