Package 'itrimhoch'

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Type Package

Title Improved Trimmed Weighted Hochberg Procedures and Sample Size Optimization

Version 1.0.0

Description

The improved trimmed weighted Hochberg procedure provides increased statistical power and relaxes the dependence assumptions for familywise error rate control compared to the original weighted Hochberg procedure. This package computes the boundaries required for implementing the proposed methodology and includes sample size optimization methods.
See Gou, J., Chang, Y., Li, T., and Zhang, F.(2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

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`find_k_given_rho_target_mvtnorm`

Find the difference between the error rate when k and rho are both given and the prespecified alpha level

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Description

Find the difference between the error rate when k and rho are both given and the prespecified alpha level

Usage

```
find_k_given_rho_target_mvtnorm(k, rho, alpha, alphavec = c(alpha/2, alpha/2))
```

Arguments

`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`rho`	the correlation coefficient between two test statistics
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the difference between the error rate when k is specified and rho is optimal and the prespecified alpha level

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`find_k_target_mvtnorm` *Find the difference between the error rate when k is specified and rho is optimal and the prespecified alpha level*

Description

Find the difference between the error rate when k is specified and rho is optimal and the prespecified alpha level

Usage

```
find_k_target_mvtnorm(k, alpha, alphavec = c(alpha/2, alpha/2))
```

Arguments

`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the difference between the error rate when k is specified and rho is optimal and the prespecified alpha level

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`find_rho_target_mvtnorm` *Find the partial derivative of the error rate with respect to the correlation coefficient rho when k and rho are given*

Description

Find the partial derivative of the error rate with respect to the correlation coefficient rho when k and rho are given

Usage

```
find_rho_target_mvtnorm(rho, k, alpha, alphavec = c(alpha/2, alpha/2))
```

Arguments

`rho`	the correlation coefficient between two test statistics
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the partial derivative of the error rate with respect to the correlation coefficient rho

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`iHpTarget1` *Find the difference between the achieved power and the desired power for rejecting H1 using the improved trimmed or truncated weighted Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the improved trimmed or truncated weighted Hochberg procedure

Usage

```
iHpTarget1(n, alpha1, alpha, k, beta1, deltavec, rho)
```

Arguments

n	the sample size
alpha1	the weighted significance levels assigned to H1
alpha	the significance level
k	a pre-specified constant in the improved trimmed weighted Hochberg procedure
beta1	one minus the desired power for rejecting H1
deltavec	a numeric vector of two values representing the effect sizes for the two hypotheses
rho	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H1 using the improved trimmed or truncated weighted Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

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iHpTarget1m *Find the difference between the achieved power and the desired power for rejecting H1 using the improved trimmed or truncated weighted Hochberg procedure with allowance for different data maturities*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the improved trimmed or truncated weighted Hochberg procedure with allowance for different data maturities

Usage

```
iHpTarget1m(n, alpha1, alpha, k, beta1, deltavec, rho, maturity)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`beta1`	one minus the desired power for rejecting H1
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses

Value

the difference between the achieved power and the desired power for rejecting H1

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

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iHpTarget2 *Find the difference between the achieved power and the desired power for rejecting H2 using the improved trimmed or truncated weighted Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the improved trimmed or truncated weighted Hochberg procedure

Usage

```
iHpTarget2(n, alpha1, alpha, k, beta2, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H2 using the improved trimmed or truncated weighted Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`iHpTarget2m` *Find the difference between the achieved power and the desired power for rejecting H2 using the improved trimmed or truncated weighted Hochberg procedure with allowance for different data maturities*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the improved trimmed or truncated weighted Hochberg procedure with allowance for different data maturities

Usage

```
iHpTarget2m(n, alpha1, alpha, k, beta2, deltavec, rho, maturity)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses

Value

the difference between the achieved power and the desired power for rejecting H2

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`interpolate_zero` *Calculate the x-coordinates of a function where zero crossings occur*

Description

Calculate the x-coordinates of a function where zero crossings occur

Usage

```
interpolate_zero(values, x = NULL)
```

Arguments

`values`	a numeric vector representing the function's output at specific points
`x`	Aa vector of x-coordinates corresponding to the values. If not provided, it defaults to 1:length(values)

Value

the x-coordinates where zero crossings occur. If no crossings are found, it returns NA itwcHochPower *Power for rejecting H1 using various types of the Hochberg Procedure*

Description

Power for rejecting H1 using various types of the Hochberg Procedure

Usage

```
itwcHochPower(n, alpha1, alpha, deltavec, rho, proctype = "i", k = 0)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`proctype`	the improved trimmed weighted Hochberg procedure is denoted by `i`, the trimmed weighted Hochberg procedure is denoted by `t` , the weighted Hochberg procedure is denoted by `w`, and the conservative weighted Hochberg procedure is denoted by `c`
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure

Value

the power for rejecting H1 is denoted by `pwr1`, the power for rejecting H2 is denoted by `pwr2`, and the power for rejecting both H1 and H2 is denoted by `pwr12`

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
itwcHochPower(n = 100,
alpha1 = 0.0125, alpha = 0.025,
deltavec = c(0.2, 0.25), rho = 0.2,
proctype = "i", k = 0)
itwcHochPower(n = 100,
alpha1 = 0.0125, alpha = 0.025,
deltavec = c(0, 0), rho = 0,
proctype = "w", k = 0)
```

optk — *The two-step algorithm to calculate the best k value for the improved trimmed Hochberg method to ensure that the maximum type I error rate reaches alpha exactly when rho is arbitrary*

Description

The two-step algorithm to calculate the best k value for the improved trimmed Hochberg method to ensure that the maximum type I error rate reaches alpha exactly when rho is arbitrary

Usage

```
optk(alpha, alphavec = c(alpha/2, alpha/2))
```

Arguments

`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the best k value `k_opt` and the rho value that makes the type I error rate reaches the maximum value `rho_opt`

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
optk(alpha = 0.025)
```

`optrho` *Calculate the rho value that reaches the maximum type I error rate in the improved trimmed Hochberg method when k value is given*

Description

Calculate the rho value that reaches the maximum type I error rate in the improved trimmed Hochberg method when k value is given

Usage

```
optrho(k, alpha, alphavec = c(alpha/2, alpha/2))
```

Arguments

`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the rho value that makes the type I error rate reaches the maximum value `rho_opt` and the type I error rate `errorrate`

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
optrho(k = 2/3, alpha = 0.025)
```

`optsamplesize_iHp` *Compute the optimal sample size for the improved trimmed weighted Hochberg procedure*

Description

Compute the optimal sample size for the improved trimmed weighted Hochberg procedure

Usage

```
optsamplesize_iHp(
  alpha,
  k,
  betavec,
  deltavec,
  rho,
  ninterval = c(2, 2000),
  alphalist = seq(from = 0, to = alpha, by = 0.005)
)
```

Arguments

`alpha`	the significance level
`k`	a pre-specified constant in the improved trimmed weighted Hochberg procedure
`betavec`	a numeric vector of two values, including one minus the desired power for rejecting H1 and one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`ninterval`	a vector containing the end-points of the interval to be searched for optimal sample size
`alphalist`	a vector of discrete alpha values

Value

the overall optimal sample size for the improved trimmed weighted Hochberg procedure

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
rrr <- 2 # Allocation ratio
alpha <- 0.025
k <- 2/3
ninterval <- c(2, 1000)
betavec <- c(0.05, 0.15)
rho <- 0.3
psivec <- c(0.67, 0.73)
thetavec <- log(psivec)
deltavec <- (-thetavec)*sqrt(rrr)/(1+rrr)
result <- optsamplesize_iHp(alpha = alpha, k = k,
betavec = betavec, deltavec = deltavec,
rho = rho, ninterval = ninterval)
result$nopt
```

---

optsamplesize_iHpm — *Compute the optimal sample size for the improved trimmed weighted Hochberg procedure with allowance for different data maturities*

Description

Compute the optimal sample size for the improved trimmed weighted Hochberg procedure with allowance for different data maturities

Usage

```
optsamplesize_iHpm(
  alpha,
  k,
  betavec,
  deltavec,
  rho,
  maturity,
  ninterval = c(2, 2000),
  alphalist = seq(from = 0, to = alpha, by = 0.005)
)
```

Arguments

alpha	the significance level
k	a pre-specified constant in the improved trimmed weighted Hochberg procedure
betavec	a numeric vector of two values, including one minus the desired power for rejecting H1 and one minus the desired power for rejecting H2
deltavec	a numeric vector of two values representing the effect sizes for the two hypotheses
rho	the correlation coefficient between two test statistics

`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses
`ninterval`	a vector containing the end-points of the interval to be searched for optimal sample size
`alphalist`	a vector of discrete alpha values

Value

the overall optimal sample size for the improved trimmed weighted Hochberg procedure with allowance for different data maturities

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
rrr <- 2
alpha <- 0.025
k <- 0.6761
ninterval <- c(2, 1000)
betavec <- c(0.10, 0.10)
rho <- 0.4
maturity <- c(0.65, 0.70)
psivec <- c(0.67, 0.73)
thetavec <- log(psivec)
deltavec <- (-thetavec)*sqrt(rrr)/(1+rrr)
result <- optsamplesize_iHpm(alpha = alpha, k = k,
betavec = betavec, deltavec = deltavec,
rho = rho, maturity = maturity,
ninterval = ninterval)
result$nopt
```

`optsamplesize_tHp` *Compute the optimal sample size for the weighted trimmed or truncated Hochberg procedure*

Description

Compute the optimal sample size for the weighted trimmed or truncated Hochberg procedure

Usage

```
optsamplesize_tHp(
  alpha,
  betavec,
  deltavec,
  rho,
  ninterval = c(2, 2000),
  alphalist = seq(from = 0, to = alpha, by = 0.005)
)
```

Arguments

`alpha`	the significance level
`betavec`	a numeric vector of two values, including one minus the desired power for rejecting H1 and one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`ninterval`	a vector containing the end-points of the interval to be searched for optimal sample size
`alphalist`	a vector of discrete alpha values

Value

the overall optimal sample size for the weighted trimmed or truncated Hochberg procedure

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
psivec <- c(0.76, 0.72)
thetavec <- log(psivec)
deltavec <- (-thetavec)/2
result <- optsamplesize_tHp(alpha = 0.05, betavec = c(0.20, 0.10),
deltavec = deltavec , rho = -0.1)
result$nopt
```

`optsamplesize_wHolmpm` *Compute the optimal sample size for the weighted Holm procedure with allowance for different data maturities*

Description

Compute the optimal sample size for the weighted Holm procedure with allowance for different data maturities

Usage

```
optsamplesize_wHolmpm(
  alpha,
  betavec,
  deltavec,
  rho,
  maturity,
  ninterval = c(2, 2000),
  alphalist = seq(from = 0, to = alpha, by = 0.005)
)
```

Arguments

`alpha`	the significance level
`betavec`	a numeric vector of two values, including one minus the desired power for rejecting H1 and one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses
`ninterval`	a vector containing the end-points of the interval to be searched for optimal sample size
`alphalist`	a vector of discrete alpha values

Value

the overall optimal sample size for the weighted Holm procedure with allowance for different data maturities

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
rrr <- 2
alpha <- 0.025
k <- 0.6761
ninterval <- c(2, 1000)
betavec <- c(0.05, 0.15)
rho <- 0.4
maturity <- c(0.65, 0.70)
psivec <- c(0.67, 0.73)
thetavec <- log(psivec)
deltavec <- (-thetavec)*sqrt(rrr)/(1+rrr)
result <- optsamplesize_wHolmpm(alpha = alpha, betavec = betavec,
deltavec = deltavec , rho = rho,
maturity = maturity, ninterval = ninterval)
result$nopt
```

`optsamplesize_wHp` *Compute the optimal sample size for the weighted Hochberg procedure*

Description

Compute the optimal sample size for the weighted Hochberg procedure

Usage

```
optsamplesize_wHp(
  alpha,
  betavec,
  deltavec,
  rho,
  ninterval = c(2, 2000),
  alphalist = seq(from = 0, to = alpha, by = 0.005)
)
```

Arguments

`alpha`	the significance level
`betavec`	a numeric vector of two values, including one minus the desired power for rejecting H1 and one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

`ninterval`	a vector containing the end-points of the interval to be searched for optimal sample size
`alphalist`	a vector of discrete alpha values

Value

the overall optimal sample size for the weighted Hochberg procedure

Author(s)

Jiangtao Gou

Fengqing Zhang

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
psivec <- c(0.76, 0.72)
thetavec <- log(psivec)
deltavec <- (-thetavec)/2
result <- optsamplesize_wHp(alpha = 0.05, betavec = c(0.20, 0.10),
deltavec = deltavec , rho = -0.1)
result$nopt
```

`tHpTarget1` *Find the difference between the achieved power and the desired power for rejecting H1 using the weighted trimmed or truncated Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the weighted trimmed or truncated Hochberg procedure

Usage

```
tHpTarget1(n, alpha1, alpha, beta1, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta1`	one minus the desired power for rejecting H1

`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H1 using the weighted trimmed or truncated Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`tHpTarget2` *Find the difference between the achieved power and the desired power for rejecting H2 using the weighted trimmed or truncated Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the weighted trimmed or truncated Hochberg procedure

Usage

```
tHpTarget2(n, alpha1, alpha, beta2, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H2 using the weighted trimmed or truncated Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

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typeIerror_Simes_mvtnorm

Calculate the type I error rate of the weighted Simes test

Description

Calculate the type I error rate of the weighted Simes test

Usage

```
typeIerror_Simes_mvtnorm(
  rho,
  adjFct = 0,
  alpha,
  alphavec = c(alpha/2, alpha/2)
)
```

Arguments

`rho`	the correlation coefficient between two test statistics
`adjFct`	a pre-specified constant in the improved weighted Hochberg procedure, called the adjustment factor or k value
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the type I error rate

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
typeIerror_trimSimes_mvtnorm(rho = 0, adjFct = 0, alpha = 0.05)
```

`typeIerror_trimSimes_mvtnorm`
Calculate the type I error rate of the trimmed weighted Simes test

---

Description

Calculate the type I error rate of the trimmed weighted Simes test

Usage

```
typeIerror_trimSimes_mvtnorm(
  rho,
  adjFct,
  alpha,
  alphavec = c(alpha/2, alpha/2)
)
```

Arguments

`rho`	the correlation coefficient between two test statistics
`adjFct`	a pre-specified constant in the improved trimmed weighted Hochberg procedure, called the adjustment factor or k value
`alpha`	the significance level
`alphavec`	a numeric vector of two values representing the weighted significance levels assigned to the two hypotheses

Value

the type I error rate

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

Examples

```
typeIerror_trimSimes_mvtnorm(rho = 0, adjFct = 0, alpha = 0.05)
```

wHolmTarget1 *Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Holm procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Holm procedure

Usage

```
wHolmTarget1(n, alpha1, alpha, beta1, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta1`	one minus the desired power for rejecting H1
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H1

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`wHolmTarget1m` *Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Holm procedure with allowance for different data maturities*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Holm procedure with allowance for different data maturities

Usage

```
wHolmTarget1m(n, alpha1, alpha, beta1, deltavec, rho, maturity)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta1`	one minus the desired power for rejecting H1
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses

Value

the difference between the achieved power and the desired power for rejecting H1

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`wHolmTarget2` *Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Holm procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Holm procedure

Usage

```
wHolmTarget2(n, alpha1, alpha, beta2, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H2

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`wHolmTarget2m` *Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Holm procedure with allowance for different data maturities*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Holm procedure with allowance for different data maturities

Usage

```
wHolmTarget2m(n, alpha1, alpha, beta2, deltavec, rho, maturity)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics
`maturity`	a numeric vector of two values representing the data maturities for the two hypotheses

Value

the difference between the achieved power and the desired power for rejecting H2

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

wHpTarget1 — *Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H1 using the weighted Hochberg procedure

Usage

```
wHpTarget1(n, alpha1, alpha, beta1, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta1`	one minus the desired power for rejecting H1
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H1 using the weighted Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

`wHpTarget2` *Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Hochberg procedure*

Description

Find the difference between the achieved power and the desired power for rejecting H2 using the weighted Hochberg procedure

Usage

```
wHpTarget2(n, alpha1, alpha, beta2, deltavec, rho)
```

Arguments

`n`	the sample size
`alpha1`	the weighted significance levels assigned to H1
`alpha`	the significance level
`beta2`	one minus the desired power for rejecting H2
`deltavec`	a numeric vector of two values representing the effect sizes for the two hypotheses
`rho`	the correlation coefficient between two test statistics

Value

the difference between the achieved power and the desired power for rejecting H2 using the weighted Hochberg procedure

Author(s)

Jiangtao Gou

References

Gou, J., Chang, Y., Li, T., and Zhang, F. (2025). Improved trimmed weighted Hochberg procedures with two endpoints and sample size optimization. Technical Report.

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