Package 'SurrogateRank'

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Type Package

Title Rank-Based Test to Evaluate a Surrogate Marker

Version 1.0

Description
Uses a novel rank-based nonparametric approach to evaluate a surrogate marker in a small sample size setting. Details are described in Parast et al (2024) <doi:10.1093/biomtc/ujad035>. A tutorial for this package can be found at <https://laylaparast.com/surrogaterank>.

License GPL

Imports stats

NeedsCompilation no

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Depends R (>= 3.5.0)

Contents

`delta.calculate` *Calculates the rank-based test statistic for Y and S and the difference, delta*

Description

Calculates the rank-based test statistic for Y and the rank-based test statistic for S and the difference, delta, along with corresponding standard error estimates

Usage

```
delta.calculate(full.data = NULL, yone = NULL, yzero = NULL, sone = NULL, szero = NULL)
```

Arguments

full.data	either full.data or yone, yzero, sone, szero must be supplied; if full data is supplied it must be in the following format: one observation per row, Y is in the first column, S is in the second column, treatment group (0 or 1) is in the third column.
yone	primary outcome, Y, in group 1
yzero	primary outcome, Y, in group 0
sone	surrogate marker, S, in group 1
szero	surrogate marker, S, in group 0

Value

u.y	rank-based test statistic for Y
u.s	rank-based test statistic for S
delta	difference, u.y-u.s
sd.u.y	standard error estimate of u.y
sd.u.s	standard error estimate of u.s
sd.delta	standard error estimate of delta

Author(s)

Layla Parast

Examples

```
data(example.data)
delta.calculate(yone = example.data$y1, yzero = example.data$y0, sone = example.data$s1,
szero = example.data$s0)
```

---

est.power *Estimated power to detect a valid surrogate*

Description

Calculates the estimated power to detect a valid surrogate given a total sample size and specified alternative

Usage

```
est.power(n.total, rho = 0.8, u.y.alt, delta.alt, power.want.s = 0.7)
```

Arguments

n.total	total sample size in study
rho	rank correlation between Y and S in group 0, default is 0.8
u.y.alt	specified alternative for u.y
delta.alt	specified alternative for delta
power.want.s	desired power for u.s, default is 0.7

Value

estimated power

Author(s)

Layla Parast

Examples

```
est.power(n.total = 50, rho = 0.8, u.y.alt=0.9, delta.alt = 0.1)
```

---

example.data *Example data*

Description

Example data use to illustrate the functions

Usage

```
data("example.data")
```

Format

A list with 4 elements representing 25 observations from a treatment group (group 1) and 25 observations from a control group (group 0):

`y1` the primary outcome,Y, in group 1

`y0` the primary outcome, Y, in group 0

`s1` the surrogate marker, S, in group 1

`s0` the surrogate marker, S, in group 0

Examples

```
data(example.data)
```

---

test.surrogate *Tests whether the surrogate is valid*

Description

Calculates the rank-based test statistic for Y and the rank-based test statistic for S and the difference, delta, along with corresponding standard error estimates, then tests whether the surrogate is valid

Usage

```
test.surrogate(full.data = NULL, yone = NULL, yzero = NULL, sone = NULL,
szero = NULL, epsilon = NULL, power.want.s = 0.7, u.y.hyp = NULL)
```

Arguments

full.data	either full.data or yone, yzero, sone, szero must be supplied; if full data is supplied it must be in the following format: one observation per row, Y is in the first column, S is in the second column, treatment group (0 or 1) is in the third column.
yone	primary outcome, Y, in group 1
yzero	primary outcome, Y, in group 0
sone	surrogate marker, S, in group 1
szero	surrogate marker, S, in group 0
epsilon	threshold to use for delta, default calculates epsilon as a function of desired power for S
power.want.s	desired power for S, default is 0.7
u.y.hyp	hypothesized value of u.y used in the calculation of epsilon, default uses estimated valued of u.y

Value

u.y	rank-based test statistic for Y
u.s	rank-based test statistic for S
delta	difference, u.y-u.s
sd.u.y	standard error estimate of u.y
sd.u.s	standard error estimate of u.s
sd.delta	standard error estimate of delta
ci.delta	1-sided confidence interval for delta
epsilon.used	the epsilon value used for the test
is.surrogate	logical, TRUE if test indicates S is a good surrogate, FALSE otherwise

Author(s)

Layla Parast

Examples

```
data(example.data)
test.surrogate(yone = example.data$y1, yzero = example.data$y0, sone = example.data$s1,
szero = example.data$s0)
```

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