

# 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](https://doi.org/10.1093/biomtc/ujad035)>.

**License** GPL

**Imports** stats

**NeedsCompilation** no

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delta.calculate	<i>Calculates the rank-based test statistic for Y and S and the difference, delta</i>
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## 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)
```

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est.power

*Estimated power to detect a valid surrogate*

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**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 u.s
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)
```

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example.data

*Example data*

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**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)
```

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test.surrogate	<i>Tests whether the surrogate is valid</i>
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### 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 value 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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