Package ‘TrendInTrend’

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Type Package

Title Odds Ratio Estimation and Power Calculation for the Trend in Trend Model

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Author Xinyao Ji and Ashkan Ertefaie

Maintainer Ashkan Ertefaie <ashkan_ertefaie@urmc.rochester.edu>

Description Estimation of causal odds ratio and power calculation given trends in exposure prevalence and outcome frequencies of stratified data.

Depends R (>= 3.2.2), stats

Imports pROC, rms

License GPL (>= 2)

RoxygenNote 6.0.1

NeedsCompilation no

Repository CRAN

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R topics documented:

GenData *Generate simulation data*

Description

Generate simulation data

Usage

```
GenData()
```

OR *An Odds Ratio Estimation Function*

Description

estimate causal odds ratio given trends in exposure prevalence and outcome frequencies of stratified data. The optimization algorithm may not converge to the global maxima of the likelihood function. We recomment to run the OR function for multiple starting points and pick the one that is associated with the highest log-likelihood value.

Usage

```
OR(n11, n10, n01, n00,bnull)
```

Arguments

n11	A G by T matrix with n11[i,j] being the counts of positive outcomes among treated subjests within group i at time j;
n10	A G by T matrix with n10[i,j] being the counts of negative outcomes among treated subjests within group i at time j;
n01	A G by T matrix with n01[i,j] being the counts of positive outcomes among control subjests within group i at time j;
n00	A G by T matrix with n00[i,j] being the counts of negative outcomes among control subjests within group i at time j;
bnull	The initial values for the optimization algorithm. Defult is (-4,0,0).

Value

ORs ratio, 95% conference interval and log-likelihood value

References

Ji, X., Small, D. S., Leonard, C. E., & Hennessy, S. (2017). The trend-in-trend research design for causal inference. Epidemiology (Cambridge, Mass.), 28(4), 529.

Examples

```
data <- GenData()
n11 <- data[[1]]
n10 <- data[[2]]
n01 <- data[[3]]
n00 <- data[[4]]
results1 <- OR(n11,n10,n01,n00,bnull=c(-4,0,0))
results2 <- OR(n11,n10,n01,n00,bnull=c(-5,0,0))
results2 <- OR(n11,n10,n01,n00,bnull=c(-4,1,-1))
```

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ttdetect — *Finding a detectable odds Ratio with a given power*

Description

Monte Carlo power calculation for a trend-in-trend design

Usage

```
ttdetect(N,time,G,cstat,alpha_t,beta_0,power,nrep, OR.vec)
```

Arguments

`N`	Sample size.
`time`	Number of time points.
`G`	Number of CPE strata
`cstat`	Value of the c-statistic.
`alpha_t`	A scaler that qunatifies the trend in exposure prevalence.
`beta_0`	Intercept of the outcome model.
`power`	A given power.
`nrep`	Number of Monte Carlo replicates.
`OR.vec`	A vector of odds Ratios

Value

An object 'ttdetect' is a list of containing the following components:

`Power`	A vector of calculated powers for a given OR.vec
`OR.vec`	A vector of odds Ratios
`DetectDifference`	A detectable difference for a given power value

References

Ertefaie, A., Small, D. S., Ji, X., Leonard, C., & Hennessy, S. (2018) Statistical Power for Trend-in-trend Design. Epidemiology (Cambridge, Mass.), 29(3), 21-23.

Examples

```
## Not run:
set.seed(123)
ttdetect(N=10000,time=10,G=10,cstat=0.75,alpha_t= 0.4,beta_0=-4.3,
power=0.80,nrep=50, OR.vec=c(1.9,2.0,2.1,2.2))

## End(Not run)
```

`ttpower` *Power calculation in trend-in-trend design*

Description

Monte Carlo power calculation for a trend-in-trend design

Usage

```
ttpower(N,time,G,cstat,alpha_t,beta_0,h1.OR,nrep)
```

Arguments

`N`	Sample size.
`time`	Number of time points.
`G`	Number of CPE strata
`cstat`	Value of the c-statistic.
`alpha_t`	A scaler that qunatifies the trend in exposure prevalence.
`beta_0`	Intercept of the outcome model.
`h1.OR`	A given odds ratio.
`nrep`	Number of Monte Carlo replicates.

Value

Power of detecting the given Odds Ratio

References

Ertefaie, A., Small, D. S., Ji, X., Leonard, C., & Hennessy, S. (2018) Statistical Power for Trend-in-trend Design. Epidemiology (Cambridge, Mass.), 29(3), 21-23.

Examples

```
## Not run:
set.seed(123)
ttpower(N=10000,time=10,G=10,cstat=0.75,alpha_t= 0.4,beta_0=-4.3,h1.OR=1.5,nrep=50)

## End(Not run)
```

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