Package ‘poisDoubleSamp’

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Title Confidence Intervals with Poisson Double Sampling
Description Functions to create confidence intervals for ratios of Poisson
rates under misclassification using double sampling. Implementations of the
methods described in Kahle, D., P. Young, B. Greer, and D. Young (2016).
``Confidence Intervals for the Ratio of Two Poisson Rates Under One-Way
Differential Misclassification Using Double Sampling." Computational
Statistics & Data Analysis, 95:122–132.

URL https://github.com/dkahle/poisDoubleSamp

BugReports https://github.com/dkahle/poisDoubleSamp/issues

LinkingTo Rcpp

Imports Rcpp, stats

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Compute the marginal MLE of the ratio of two Poisson rates in a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets.

Usage

approxMargMLE(
  data,
  N1,
  N2,
  N01,
  N02,
  l = 0,
  u = 1000,
  out = c("par", "all"),
  tol = 1e-10
)

Arguments

data the vector of counts of the fallible data (z11, z12, z21, z22) followed by the infallible data (m011, m012, m021, m022, y01, y02)
N1 the opportunity size of group 1 for the fallible data
N2 the opportunity size of group 2 for the fallible data
N01 the opportunity size of group 1 for the infallible data
N02 the opportunity size of group 2 for the infallible data
l the lower end of the range of possible phi’s (for optim)
u the upper end of the range of possible phi’s (for optim)
out "par" or "all" (for the output of optim)
tol tolerance parameter for the rmle EM algorithm

Value

a named vector containing the marginal mle of phi
approxMargMLECI

 Computes the profile MLE CI of phi

 Description

 Compute the profile MLE confidence interval of the ratio of two Poisson rates in a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets. This uses a C++ implementation of the EM algorithm.

 References


 Examples

 # small example
 z11 <- 34; z12 <- 35; N1 <- 10;
 z21 <- 22; z22 <- 31; N2 <- 10;
 m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
 m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
 data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)

 fullMLE(data, N1, N2, N01, N02)
 margMLE(data, N1, N2, N01, N02)
 approxMargMLE(data, N1, N2, N01, N02)

 ## Not run:

 # big example :
 z11 <- 477; z12 <- 1025; N1 <- 16186;
 z21 <- 255; z22 <- 1450; N2 <- 18811;
 m011 <- 38; m012 <- 90; y01 <- 15; N01 <- 1500;
 m021 <- 41; m022 <- 200; y02 <- 9; N02 <- 2500;
 data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)

 fullMLE(data, N1, N2, N01, N02)
 margMLE(data, N1, N2, N01, N02) # ~1 min
 approxMargMLE(data, N1, N2, N01, N02)

 ## End(Not run)
Usage

approxMargMLECI(
  data,
  N1,
  N2,
  N01,
  N02,
  conf.level = 0.95,
  l = 0.001,
  u = 1000,
  tol = 1e-10
)

Arguments

  data        the vector of counts of the fallible data (z11, z12, z21, z22) followed by the
              infallible data (m011, m012, m021, m022, y01, y02)
  N1          the opportunity size of group 1 for the fallible data
  N2          the opportunity size of group 2 for the fallible data
  N01         the opportunity size of group 1 for the infallible data
  N02         the opportunity size of group 2 for the infallible data
  conf.level  confidence level of the interval
  l           the lower end of the range of possible phi’s (for optim)
  u           the upper end of the range of possible phi’s (for optim)
  tol         tolerance used in the EM algorithm to declare convergence

Value

  a named vector containing the marginal mle of phi

References

  Kahle, D., P. Young, B. Greer, and D. Young (2016). "Confidence Intervals for the Ratio of Two
  Poisson Rates Under One-Way Differential Misclassification Using Double Sampling." Computa-
  tional Statistics & Data Analysis, 95:122–132.

Examples

  # small example
  z11 <- 34; z12 <- 35; N1 <- 10;
  z21 <- 22; z22 <- 31; N2 <- 10;
  m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
  m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
  data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
  waldCI(data, N1, N2, N01, N02)
fullMLE

Compute the full MLEs

Description

Compute the MLEs of a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets.

Usage

fullMLE(data, N1, N2, N01, N02)

Arguments

data the vector of counts of the fallible data \((z_{11}, z_{12}, z_{21}, z_{22})\) followed by the infallible data \((m_{011}, m_{012}, m_{021}, m_{022}, y_01, y_02)\)

N1 the opportunity size of group 1 for the fallible data

N2 the opportunity size of group 2 for the fallible data

N01 the opportunity size of group 1 for the infallible data

N02 the opportunity size of group 2 for the infallible data

Details

These are the closed-form expressions for the MLEs.
margMLE

Compute the marginal MLE of phi

Description

Compute the marginal MLE of the ratio of two Poisson rates in a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets.

Usage

margMLE(data, N1, N2, N01, N02, l = 0.001, u = 1000, out = c("par", "all"))
Arguments

data the vector of counts of the fallible data \((z_{11}, z_{12}, z_{21}, z_{22})\) followed by the infallible data \((m_{011}, m_{012}, m_{021}, m_{022}, y_{01}, y_{02})\)

\(N_1\) the opportunity size of group 1 for the fallible data

\(N_2\) the opportunity size of group 2 for the fallible data

\(N_{01}\) the opportunity size of group 1 for the infallible data

\(N_{02}\) the opportunity size of group 2 for the infallible data

\(l\) the lower end of the range of possible \(\phi\)'s (for optim)

\(u\) the upper end of the range of possible \(\phi\)'s (for optim)

out "par" or "all" (for the output of optim)

Value

a named vector containing the marginal mle of \(\phi\)

References


Examples

# small example
z11 <- 34; z12 <- 35; N1 <- 10;
z21 <- 22; z22 <- 31; N2 <- 10;
m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
fullMLE(data, N1, N2, N01, N02)
margMLE(data, N1, N2, N01, N02)

## Not run:
# big example :
z11 <- 477; z12 <- 1025; N1 <- 16186;
z21 <- 255; z22 <- 1450; N2 <- 18811;
m011 <- 38; m012 <- 90; y01 <- 15; N01 <- 1500;
m021 <- 41; m022 <- 200; y02 <- 9; N02 <- 2500;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
fullMLE(data, N1, N2, N01, N02)
margMLE(data, N1, N2, N01, N02)
## margMLECI

*Compute the marginal MLE confidence interval for the phi*

### Description

Compute the marginal MLE confidence interval of the ratio of two Poisson rates in a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets.

### Usage

```r
margMLECI(data, N1, N2, N01, N02, conf.level = 0.95, l = 1e-10, u = 1e+10)
```

### Arguments

- `data`: the vector of counts of the fallible data (z11, z12, z21, z22) followed by the infallible data (m011, m012, m021, m022, y01, y02)
- `N1`: the opportunity size of group 1 for the fallible data
- `N2`: the opportunity size of group 2 for the fallible data
- `N01`: the opportunity size of group 1 for the infallible data
- `N02`: the opportunity size of group 2 for the infallible data
- `conf.level`: confidence level of the interval
- `l`: the lower end of the range of possible phi’s (for optim)
- `u`: the upper end of the range of possible phi’s (for optim)

### Value

A named vector containing the lower and upper bounds of the confidence interval

### References

Examples

# small example
z11 <- 34; z12 <- 35; N1 <- 10;
z21 <- 22; z22 <- 31; N2 <- 10;
m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)

## Not run:

# big example:
z11 <- 477; z12 <- 1025; N1 <- 16186;
z21 <- 255; z22 <- 1450; N2 <- 18811;
m011 <- 38; m012 <- 90; y01 <- 15; N01 <- 1500;
m021 <- 41; m022 <- 200; y02 <- 9; N02 <- 2500;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)

## End(Not run)

---

poisDoubleSamp

poisDoubleSamp : Confidence intervals with Poisson double sampling

Description

Compute the profile MLE CI of phi

Description

Compute the profile MLE confidence interval of the ratio of two Poisson rates in a two-sample Poisson rate problem with misclassified data given fallible and infallible datasets. This uses a C++ implementation of the EM algorithm.

Usage

profMLECI(
  data,
  N1,
  N2,
  N01,
  N02,
  conf.level = 0.95,
  l = 0.001,
  u = 1000,
  tol = 1e-10
)

Arguments

data the vector of counts of the fallible data (z11, z12, z21, z22) followed by the infallible data (m011, m012, m021, m022, y01, y02)
N1 the opportunity size of group 1 for the fallible data
N2 the opportunity size of group 2 for the fallible data
N01 the opportunity size of group 1 for the infallible data
N02 the opportunity size of group 2 for the infallible data
conf.level confidence level of the interval
l the lower end of the range of possible phi’s (for optim)
u the upper end of the range of possible phi’s (for optim)
tol tolerance used in the EM algorithm to declare convergence

Value

a named vector containing the marginal mle of phi

References

Examples

```r
# small example
z11 <- 34; z12 <- 35; N1 <- 10;
z21 <- 22; z22 <- 31; N2 <- 10;
m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)
```

```r
## Not run:
# big example :
z11 <- 477; z12 <- 1025; N1 <- 16186;
z21 <- 255; z22 <- 1450; N2 <- 18811;
m011 <- 38; m012 <- 90; y01 <- 15; N01 <- 1500;
m021 <- 41; m022 <- 200; y02 <- 9; N02 <- 2500;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)
```

```r
## End(Not run)
```

### Description

Compute the Wald confidence interval of a two-sample Poisson rate with misclassified data given fallible and infallible datasets.

### Usage

```r
waldCI(data, N1, N2, N01, N02, conf.level = 0.95)
```
Arguments

data the vector of counts of the fallible data (z11, z12, z21, z22) followed by the infallible data (m011, m012, m021, m022, y01, y02)

N1 the opportunity size of group 1 for the fallible data

N2 the opportunity size of group 2 for the fallible data

N01 the opportunity size of group 1 for the infallible data

N02 the opportunity size of group 2 for the infallible data

conf.level confidence level of the interval

Value

a named vector containing the lower and upper bounds of the confidence interval

Examples

# small example
z11 <- 34; z12 <- 35; N1 <- 10;
z21 <- 22; z22 <- 31; N2 <- 10;
m011 <- 9; m012 <- 1; y01 <- 3; N01 <- 3;
m021 <- 8; m022 <- 8; y02 <- 2; N02 <- 3;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)

## Not run:

# big example :
z11 <- 477; z12 <- 1025; N1 <- 16186;
z21 <- 255; z22 <- 1450; N2 <- 18811;
m011 <- 38; m012 <- 90; y01 <- 15; N01 <- 1500;
m021 <- 41; m022 <- 200; y02 <- 9; N02 <- 2500;
data <- c(z11, z12, z21, z22, m011, m012, m021, m022, y01, y02)
waldCI(data, N1, N2, N01, N02)
margMLECI(data, N1, N2, N01, N02)
profMLECI(data, N1, N2, N01, N02)
approxMargMLECI(data, N1, N2, N01, N02)

## End(Not run)
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