Package ‘poisDoubleSamp’

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Version 1.1.1

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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RoxygenNote 7.1.2

Encoding UTF-8

NeedsCompilation yes

Author David Kahle [aut, cre] (<https://orcid.org/0000-0002-9999-1558>),
Phil Young [aut],
Dean Young [aut]

Maintainer David Kahle <david@kahle.io>

Repository CRAN

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R topics documented:

`approxMargMLE` *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

```
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

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." Computational 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)

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)
```

`approxMargMLECI` *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++ implemention of the EM algorithm.

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." Computational 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)
```

```
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)
```

---

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 (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

Details

These are the closed-form expressions for the MLEs.

Value

a named vector containing the mles of each of the parameters (phi, la12, la21, la22, th1, and th2)

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." Computational 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)

fullMLE(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)



## End(Not run)
```

---

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 (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)

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." Computational 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)

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)
```

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

---

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

```
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

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.

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

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.

profMLECI *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++ implemention 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

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.

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)
```

`waldCI` *Compute the Wald confidence interval*

Description

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

Usage

```
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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