Package 'MIWilson'

August 23, 2021

Title Implementing the MI-Wilson Confidence Interval

Version 1.0.0

Description Implements the Wilson confidence interval
for binomial proportions given multiple imputations of missing data (detailed
theory provided in ``Wilson Confidence Intervals for Binomial
Proportions With Multiple Imputation for Missing
Data" (A. Lott & J. Reiter, 2018)). Our package also implements a Wald confidence
interval and allows for both MIDs object and proportion vector arguments.

License MIT + file LICENSE

Encoding UTF-8

RoxygenNote 7.1.1

URL https://github.com/hungf8342/MIWilson

BugReports https://github.com/hungf8342/MIWilson/issues

Imports dplyr, magrittr, mice, stats

Suggests rmarkdown, knitr, testthat (>= 3.0.0)

Config/testthat/edition 3

VignetteBuilder knitr

NeedsCompilation no

Author Frances Hung [aut, cre]

Maintainer Frances Hung <wyfhung@gmail.com>

Repository CRAN

Date/Publication 2021-08-23 17:40:02 UTC

R topics documented:

`Bm` *Calculate between-imputation variance of the response mean*

$$\frac{\sum(\hat{Q}\_l - \bar{Q})}{m-1}$$

Description

Calculate between-imputation variance of the response mean

$$\frac{\sum(\hat{Q}_l - \bar{Q})}{m-1}$$

Usage

```
Bm(qhats, m)
```

Arguments

`qhats`	vector of Qhats(means of response for each imputed dataset)
`m`	number of imputed datasets

Value

Bm: the between-dataset variance of the response mean

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
m = imp$m
Bm(qhats, m)
```

`dof` *Calculate degrees of freedom used in calculating confidence intervals of t-distributed proportion point estimate $\bar{Q}\_m$*

Description

Calculate degrees of freedom used in calculating confidence intervals of t-distributed proportion point estimate $\bar{Q}_m$

Usage

```
dof(qhats, m, nrow)
```

Arguments

`qhats`	vector of Qhats(means of response for each imputed dataset)
`m`	number of imputed datasets
`nrow`	number of observations in the imputed dataset

Value

degrees of freedom

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
m = imp$m
nrow = imp$data %>% nrow()
dof(qhats, m, nrow)
```

`mi_wald` *Calculates the specified Wald CI of a binomial proportion variable, given imputed data sets.*

Description

Calculates the specified Wald CI of a binomial proportion variable, given imputed data sets.

Usage

```
mi_wald(mids_obj, response, ci_level = 0.95, summaries = TRUE)
```

Arguments

mids_obj	mids object created by mice package
response	string name of response variable (must be 0-1 valued)
ci_level	desired confidence interval level (defaults to 95%)
summaries	boolean: should summary helper values be printed (default TRUE)

Value

two-length vector of Wald lower CI and upper CI

Examples

```
imp = mice::mice(mice::nhanes %>% dplyr::mutate(hyp = hyp-1))
mi_wald(imp, "hyp", 0.95)
```

---

mi_wald_phat *Calculates the MI-Wald interval if given a vector of observed binomial proportions (one for each imputed data frame)*

Description

Calculates the MI-Wald interval if given a vector of observed binomial proportions (one for each imputed data frame)

Usage

```
mi_wald_phat(phats, n, ci_level = 0.95, summaries = TRUE)
```

Arguments

phats	vector of binomial proportions (one for each imputation)
n	the common number of observations over the imputed dataframes
ci_level	desired confidence interval level (default 95%)
summaries	boolean: should summary helper values be printed (default TRUE)

Value

Two-length vector of Wilson lower CI and upper CI

Related Functions

- mi_wald
- mi_wilson_phat

Examples

```
phats = c(0.2, 0.23, 0.25)
mi_wald_phat(phats, 100, 0.99, TRUE)
```

`mi_wilson` *Calculates the specified Wilson CI of a binomial proportion variable, given imputed data sets.*

Description

Calculates the specified Wilson CI of a binomial proportion variable, given imputed data sets.

Usage

```
mi_wilson(mids_obj, response, ci_level = 0.95, summaries = TRUE)
```

Arguments

`mids_obj`	mids object created by mice package
`response`	string name of response variable (must be 0-1 valued)
`ci_level`	desired confidence interval level (defaults to 95%)
`summaries`	boolean: should summary helper values be printed (default TRUE)

Value

two-length vector of Wilson lower CI and upper CI

Examples

```
imp = mice::mice(mice::nhanes %>% dplyr::mutate(hyp = hyp-1))
mi_wilson(imp, "hyp", 0.95)
```

`mi_wilson_phat` *Calculates the MI-Wilson interval if given a vector of observed binomial proportions (one for each imputed data frame)*

Description

Calculates the MI-Wilson interval if given a vector of observed binomial proportions (one for each imputed data frame)

Usage

```
mi_wilson_phat(phats, n, ci_level = 0.95, summaries = TRUE)
```

Arguments

phats	vector of binomial proportions (one for each imputation)
n	the common number of observations over the imputed dataframes
ci_level	desired confidence interval level (default 95%)
summaries	boolean: should summary helper values be printed (default TRUE)

Value

two-length vector of Wilson lower CI and upper CI

Examples

```
phats = c(0.2, 0.23, 0.25)
mi_wilson_phat(phats, 100, 0.99, TRUE)
```

Qbar *Calculate Qbar (average response over MICE datasets)*

Description

Calculate Qbar (average response over MICE datasets)

Usage

```
Qbar(qhats)
```

Arguments

qhats	vector of Qhats(response means for each imputed dataset)

Value

Qbar: the average response over MICEd datasets.

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
Qbar(qhats)
```

`Qhats` *Calculate Qhats (means of response for each imputed dataset)*

Description

Calculate Qhats (means of response for each imputed dataset)

Usage

```
Qhats(mids_obj, response)
```

Arguments

`mids_obj`	mids object created by mice package
`response`	string name of binary response variable

Value

Qhats: vector of response means for each imputed dataset

Examples

```
imp = mice::mice(mice::nhanes)
Qhats(imp, "hyp")
```

`Rm` *Helper function for getting rm, a key component for calculating degrees of freedom and the wilson CI directly*

Description

Helper function for getting rm, a key component for calculating degrees of freedom and the wilson CI directly

Usage

```
Rm(qhats, m, nrow)
```

Arguments

`qhats`	vector of Qhats(means of response for each imputed dataset)
`m`	number of imputed datasets
`nrow`	number of observations in the imputed dataset

Value

rm

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
m = imp$m
nrow = imp$data %>% nrow()
Rm(qhats, m, nrow)
```

Tm *Estimate variance of proportion point estimate* $\bar{Q}\_m$

Description

Estimate variance of proportion point estimate $\bar{Q}_m$

Usage

```
Tm(qhats, m, nrow)
```

Arguments

qhats	vector of Qhats(means of response for each imputed dataset)
m	number of imputed datasets
nrow	number of observations in the imputed dataset

Value

variance of proportion point estimate

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
m = imp$m
nrow = imp$data %>% nrow()
Tm(qhats, m, nrow)
```

Ubar *Calculate Ubar (average response variance over MICE datasets)*

Description

Calculate Ubar (average response variance over MICE datasets)

Usage

```
Ubar(qhats, m, nrow)
```

Arguments

qhats	vector of Qhats(means of response for each imputed dataset)
m	number of imputed datasets
nrow	number of observations in the imputed dataset

Value

Ubar: average response variance over MICE datasets

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
m = imp$m
nrow = imp$data %>% nrow()
Ubar(qhats, m, nrow)
```

Uhats *Calculate Uhats (variance for each imputed dataset)*

Description

Calculate Uhats (variance for each imputed dataset)

Usage

```
Uhats(qhats, nrow)
```

Arguments

qhats	vector of Qhats(means of response for each imputed dataset)
nrow	number of observations in the imputed dataset

Value

Uhats: vector of response variances for each imputed dataset

Examples

```
imp = mice::mice(mice::nhanes)
qhats = Qhats(imp, "hyp")
nrow = imp$data %>% nrow()
Uhats(qhats, nrow)
```

Index