Package 'ddi'

January 26, 2020

Type Package

Title The Data Defect Index for Samples that May not be IID

Version 0.1.0

Description Implements Meng's data defect index (ddi), which represents the degree of sample bias relative to an iid sample. The data defect correlation (ddc) represents the correlation between the outcome of interest and the selection into the sample; when the sample selection is independent across the population, the ddc is zero. Details are in Meng (2018) <doi:10.1214/18-AOAS1161SF>, ``Statistical Paradises and Paradoxes in Big Data (I): Law of Large Populations, Big Data Paradox, and the 2016 US Presidential Election." Survey estimates from the Cooperative Congressional Election Study (CCES) is included to replicate the article's results.

Encoding UTF-8

URL https://github.com/kuriwaki/ddi

BugReports http://github.com/kuriwaki/ddi/issues

License GPL (>= 2)

LazyData true

RoxygenNote 7.0.2

Depends R (>= 2.10)

Suggests testthat (>= 2.1.0), dplyr, tibble

NeedsCompilation no

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R topics documented:

ddc *Data Defect Correlation*

Description

The Data Defect Correlation (ddc) is the correlation between response and group membership. It quantifies the correlation between the outcome of interest and the selection into the sample; when the sample selection is independent across members of the population, the ddc is zero. Currently both variables are binary. The data defect index (ddi) is the square of ddc. Squaring the d.d.c. is more useful for characterizing the asymptotics of ' MSE.

Usage

```
ddc(mu, muhat, N, n, cv = NULL)
```

Arguments

`mu`	Vector of population quantity of interest
`muhat`	Vector for sample estimate
`N`	Vector of population size
`n`	Vector of sample size
`cv`	Coefficient of variation of the weights, if survey weights exist and `muhat` is the weighted proportion. The coefficient of variation is a summary statistic computed by `sd(weights) / mean(weights)`.

Value

A vector of d.d.c. of the same length of the input, or a scalar if all input variables are scalars.

References

Meng, Xiao-Li (2018) <doi:10.1214/18-AOAS1161SF>, "Statistical Paradises and Paradoxes in Big Data (I): Law of Large Populations, Big Data Paradox, and the 2016 US Presidential Election." Annals of Applied Statistics 12:2, 685–726.

Examples

```
library(tibble)
library(dplyr)

data(g2016)

# 1. scalar input
select(g2016, cces_pct_djt_vv, cces_n_vv, tot_votes, votes_djt) %>%
  summarize_all(sum)

## plug those numbers in
```

```
ddc(mu = 62984824/136639786, muhat = 12284/35829, N = 136639786, n = 35829)

# 2. vector input using "with"
with(g2016, ddc(mu = pct_djt_voters, muhat = cces_pct_djt_vv, N = tot_votes, n = cces_n_vv))

# 3. vector input in tidy tibble
transmute(g2016, st,
 ddc = ddc(mu = pct_djt_voters, muhat = cces_pct_djt_vv, N = tot_votes, n = cces_n_vv))
```

`g2016` *2016 General Election Results and Survey Estimates*

Description

Donald Trump's voteshare in each U.S. state, with survey estimates from the Cooperative Congressional Election Study (pre-election wave). See Meng (2018) referenced below for more details. We focus on unweighted estimates to capture the response patterns, before correcting for any imbalances through weights.

Usage

```
g2016
```

Format

A data frame with 51 rows (all U.S. states and D.C.)

state state (full name)

st state (abbreviation).

pct_djt_voters Donald J. Trump's voteshare, the estimand.

cces_pct_djt_vv CCES unweighted proportion of Trump support, one estimate.

cces_pct_djtrund_vv CCES unweighted proportion counting Republican undecideds as Trump voters.

votes_djt Total number of votes by Trump.

tot_votes Turnout in Presidential as total number of votes cast.

cces_totdjt_vv Validated voters intending to vote for Trump. Used as the numerator for the above CCES estimates.

cces_n_vv Validated voters in survey sample. Used as the denominator for the above CCES estimates.

vap Voting Age Population in the state.

vep Voting Eligible Population in the state (estimate from the US Election Project).

Source

Cooperative Congressional Election Study (CCES) https://cces.gov.harvard.edu/ and the United States Election Project http://www.electproject.org/2016g. Created under https://github.com/kuriwaki/poll_error.

References

For an explanation in the context of d.d.i., see Meng (2018) <doi:10.1214/18-AOAS1161SF>

Examples

```
library(dplyr)
data(g2016)

transmute(g2016,
          st,
          ddc = ddc(mu = pct_djt_voters,
                    muhat = cces_pct_djt_vv,
                    N = tot_votes,
                    n = cces_n_vv))
```

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