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


Examples

```r
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))

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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


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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