Package 'DCPO'

October 12, 2022

Version 0.5.3

Title Dynamic Comparative Public Opinion

Description Estimates latent variables of public opinion cross-nationally and over time from sparse and incomparable survey data. 'DCPO' uses a population-level graded response model with country-specific item bias terms. Sampling is conducted with 'Stan'. References: Solt (2020) <doi:10.31235/osf.io/d5n9p>.

License GPL (>= 3)

Encoding UTF-8

LazyData true

ByteCompile true

Depends R (>= 3.4.0), Rcpp (>= 0.12.17), methods

Imports rstan (>= 2.18.1), rstantools (>= 2.0.0), beepr, dplyr, forcats, janitor, purrr, tibble, tidyr

LinkingTo StanHeaders (>= 2.18.0), rstan (>= 2.18.1), BH (>= 1.66.0-1), Rcpp (>= 0.12.0), RcppEigen (>= 0.3.3.4.0)

Suggests knitr

SystemRequirements GNU make

NeedsCompilation yes

RoxygenNote 7.0.0

Biarch true

Author Frederick Solt [aut, cre], Trustees of Columbia University [cph]

Maintainer Frederick Solt <frederick-solt@uiowa.edu>

Repository CRAN

Date/Publication 2020-05-29 12:50:02 UTC

R topics documented:

`DCPO-package` *DCPO: Dynamic Comparative Public Opinion*

Description

DCPO estimates dynamic comparative public opinion as a latent variable from survey data

References

Stan Development Team (2018). RStan: the R interface to Stan. R package version 2.18.2. http://mc-stan.org

---

`dcpo` *Estimate Dynamic Comparative Public Opinion*

Description

`dcpo` uses diverse survey data to estimate public opinion across countries and over time.

Usage

```
dcpo(dcpo_input, chime = TRUE, ...)
```

Arguments

`dcpo_input`	a data frame of survey items and marginals generated by `DCPOtools::dcpo_setup`
`chime`	play chime when complete?
`...`	arguments to be passed to `rstan::stan`. Defaults reset by `dcpo` are described below under details.

Details

`dcpo`, when passed a data frame `dcpo_input` of survey marginals created by `dcpo_setup`, estimates a latent variable of public opinion. See `rstan::stan` for additional options; `stan` defaults reset by `dcpo` are `seed = 324`, `thin = 2`, `cores = min(stan_args$chains, parallel::detectCores()/2)`, and `control <- list(adapt_delta = 0.99, stepsize = 0.005, max_treedepth = 14)`

Value

a stanfit object

Examples

```
out1 <- dcpo(demsup_data,
             chains = 1,
            iter = 300) # 1 chain/300 iterations for example purposes only; use defaults
```

---

dcpo_xvt *Cross-validation testing for DCPO*

Description

dcpo_xvt performs a single cross-validation test for DCPO

Usage

```
dcpo_xvt(
  dcpo_input,
  fold_number = 1,
  number_of_folds = 10,
  fold_seed = 324,
  chime = TRUE,
  ...
)
```

Arguments

dcpo_input	a data frame of survey items and marginals generated by DCPOtools::dcpo_setup
fold_number	an integer indicating the number of the fold to treated as test data in the current analysis
number_of_folds	an integer indicating the total number of folds
fold_seed	a seed for reproducibly randomly assigning observations to folds; when a complete set of k-fold cross-validations is to be performed, the same seed should be used for all
chime	play chime when complete?
...	arguments to be passed to rstan::stan. See dcpo.

Details

dcpo_xvt performs a single cross-validation test of a DCPO estimation. To perform a complete k-fold cross-validation, call it repeatedly, changing only the fold_number argument.

Value

a stanfit object

Examples

```
# Single cross-validation test with 25% test set
demsup_xvtest_25pct <- dcpo_xvt(demsup_data,
                            number_of_folds = 4,
                            iter = 300,
                        chains = 1) # 1 chain/300 iterations for example only; use defaults
```

---

demsup_data *Support for Democracy in 51 Survey Datasets*

Description

A dataset containing the prices and other attributes of almost 54,000 diamonds.

Usage

```
demsup_data
```

Format

A list of 15 elements

K an integer, the total number of countries in the data

T an integer, the total number of years in the data

Q an integer, the total number of distinct survey questions in the data

R an integer, the maximum number of response cutpoints in any survey question in the data

N an integer, the number of KTQR observations

kk a numeric vector of length N, the country of each observation

tt a numeric vector of length N, the year of each observation

qq a numeric vector of length N, the question of each observation

rr a numeric vector of length N, the response cutpoint of each observation

y_r a numeric vector of length N, the number of respondents who provided a response above the relevant cutpoint for each observation

n_r a numeric vector of length N, the total number of respondents for each observation

fixed_cutp a QxR matrix, a truth table indicating the question-cutpoint to be fixed at difficulty .5

use_delta a QxK tibble, a truth table indicating whether item difficulty should be estimated to vary by question-country to account for potential item-response bias

data an Nx14 tibble, the aggregate survey response dataset in its original format

data_args a list of length 3, indicating the arguments passed to DCPOtools::format_dcpo to generate demsup_data from demsup_data$data

Details

Data on aggregate support for democracy reported in 51 survey datasets in 998 country-years, formatted for use with the functions of the DCPO package

Source

demsup_data replicates the data employed in Claassen, Christopher. 2019. "Estimating Smooth Country-Year Panels of Public Opinion." Political Analysis 27(1):1-20. See https://github.com/fsolt/DCPOtools.

`get_xvt_results` *Get results of DCPO cross-validation testing*

Description

`get_xvt_results` performs a single cross-validation test for dcpo's estimates of cross-national public opinion

Usage

```
get_xvt_results(dcpo_xvt_output, ci = 80)
```

Arguments

`dcpo_xvt_output`	output from a single call to `DCPO::dcpo_xvt` or a k-fold test list of such output generated by purrr::map
`ci`	an integer indicating the desired width of credible interval for coverage testing; 80 is the default.

Value

a stanfit object

Examples

```
# Single cross-validation test with 25% test set
demsup_xvtest_25pct <- dcpo_xvt(demsup_data,
                            chime = FALSE,
                            number_of_folds = 4,
                            iter = 300,
                          chains = 1) # 1 chain/300 iterations for example only; use defaults

get_xvt_results(demsup_xvtest_25pct)
```

summarize_dcpo_results *Extract DCPO Results*

Description

summarize_dcpo_results is a convenience function that produces summary statistics of the main parameters of a DCPO stanfit object along with the relevant identifying information (country, year, question, and cutpoint).

Usage

```
summarize_dcpo_results(
  dcpo_input,
  dcpo_output,
  pars = c("theta", "sigma", "alpha", "beta", "delta"),
  probs = c(0.1, 0.9)
)
```

Arguments

dcpo_input	the data frame of survey items and marginals generated by DCPOtools::dcpo_setup previously passed to DCPO::dcpo to generate the stanfit object passed as dcpo_output
dcpo_output	a stanfit object output by DCPO::dcpo
pars	a character vector of parameter names to be summarized from the DCPO model: theta (mean public opinion), sigma (polarization in public opinion), alpha (question dispersion), beta (question-cutpoint difficulty), and/or delta (country-specific question bias)
probs	a numeric vector of quantiles of interest; the default is c(.1, .9)

Value

a tibble

Examples

```
out1 <- dcpo(demsup_data,
             chime = FALSE,
             chains = 1,
            iter = 300) # 1 chain/300 iterations for example purposes only; use defaults

theta_results <- summarize_dcpo_results(dcpo_input = demsup_data,
                                        dcpo_output = out1,
                                        pars = "theta")
```

Index