

Package ‘lasars’

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Title Explore Response Style in Survey Responding

Version 0.1.1

Description Provides tools to fit the latent state and response style ('lasars') model to survey data using either Particle Metropolis within Gibbs ('pmwg') or maximum likelihood estimation. The package facilitates estimation of less-biased latent state and psychologically interpretable response style parameters.

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Imports purrr, pmwg, stats

Suggests knitr, rmarkdown

VignetteBuilder knitr

Depends R (>= 3.5)

LazyData true

NeedsCompilation no

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example_lasars_data	<i>Example dataset for lasars</i>
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Description

A small Big-5 dataset used in examples and vignettes.

Usage

example_lasars_data

Format

A data frame with 50 participants and 5 latent states:

- subject** Subject identifier
- item** Survey item identifier
- response** Chosen Likert scale response
- subscale** Latent state identifier
- reverse** Identifies positively- and reverse-scored items

Source

Open Source Psychometrics

gen_pp_data	<i>Generates posterior samples</i>
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Description

This function generates posterior-predictive data

Usage

```
gen_pp_data(  
  sampled,  
  n = 20,  
  ll_func = sampled$ll_func,  
  sampling_method = "pmwg",  
  original_df = NULL,  
  subject_colname = "subject",  
  ...  
)
```

Arguments

<code>sampled</code>	A post-sampling object with parameter estimates. Should be the output of either <code>run_lasars()</code> or <code>run_latstat()</code>
<code>n</code>	the number of posterior samples being generated
<code>ll_func</code>	The likelihood function being used
<code>sampling_method</code>	A character string which reflects the sampling approach to be taken. Can take the value 'mle' or 'pmwg'
<code>original_df</code>	Necessary when <code>sampling_method = 'mle'</code> . Should be the original trial-wise data frame sampling was performed on
<code>subject_colname</code>	A character string representing the subject identifier variable
<code>...</code>	Additional parameters to pass into the pmwg <code>run_stage</code> calls

Value

A data frame

Examples

```
pp_data <- gen_pp_data(sampled = lasars_fit_result,
                      n = 5)
```

<code>lasars_fit_result</code>	<i>Example pmwg fit for lasars model</i>
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Description

Example pmwg fit for lasars model

Usage

```
lasars_fit_result
```

Format

A pmwg object with 100 iterations of 10 particles in each stage:

data Original data used for fitting
par_names A character vector of parameter names
n_pars The number of parameters listed in `par_names`
n_subject The number of subjects
subject A vector of subject identifiers

prior A list of priors
ll_func The likelihood function used for estimation
samples A list of subject (alphas), group (theta_mu) and covariance matrix (theta_sig) samples
init The initialised pmwg object

lasars_ll_func	<i>Likelihood function for lasars Model</i>
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Description

The powerhouse of the lasars model - calculates the likelihood of the observed data, given the set of input parameters. If sample = TRUE, input parameters will be used to generate data.

Usage

```
lasars_ll_func(
  x,
  data,
  sample = FALSE,
  resp_opts,
  subject_colname,
  response_colname,
  latentState_colname,
  direction_colname = NULL,
  rev_score_id = NULL
)
```

Arguments

x	A named vector of parameter estimates
data	A trial-wise data frame
sample	A boolean variable reflecting whether the ll func should evaluate likelihood or generate data
resp_opts	A numeric value representing the number of response options available in the scale
subject_colname	A character string representing the subject identifier variable
response_colname	A character string representing the chosen Likert scale response
latentState_colname	A character string representing the latent state identifier variable
direction_colname	A character string representing the reverse-coding variable
rev_score_id	A character string representing the level of the direction variable which indicates reverse-scored items

Value

A likelihood value

Examples

```
ll_func <- lasars_ll_func(x = c("mu.extra" = 0.2,
                                "mu.open" = 0.1,
                                "mu.consc" = 0.1,
                                "mu.agree" = 0.2,
                                "mu.neuro" = 0.1,
                                "centrePref" = -.3,
                                "oddsPref" = 0.2,
                                "directionPref" = -0.5),
  data = example_lasars_data,
  resp_opts = 5,
  subject_colname = "subject",
  response_colname = "response",
  latentState_colname = "subscale",
  direction_colname = "reverse",
  rev_score_id = "TRUE")
```

latstat_ll_func

Likelihood function for Latent State Only Model

Description

The powerhouse of the latstat model - calculates the likelihood of the observed data, given the set of input parameters. If sample = TRUE, input parameters will be used to generate data.

Usage

```
latstat_ll_func(
  x,
  data,
  sample = FALSE,
  resp_opts,
  subject_colname,
  response_colname,
  latentState_colname,
  direction_colname,
  rev_score_id
)
```

Arguments

x	A named vector of parameter estimates
data	A trial-wise data frame

sample	A boolean variable reflecting whether the ll func should evaluate likelihood or generate data
resp_opts	A numeric value representing the number of response options available in the scale
subject_colname	A character string representing the subject identifier variable
response_colname	A character string representing the chosen Likert scale response
latentState_colname	A character string representing the latent state identifier variable
direction_colname	A character string representing the reverse-coding variable
rev_score_id	A character string representing the level of the direction variable which indicates reverse-scored items

Value

A likelihood value

Examples

```
ll_func <- latstat_ll_func(x = c("mu.extra" = 0.2,
                                "mu.open" = 0.1,
                                "mu.consc" = 0.1,
                                "mu.agree" = 0.2,
                                "mu.neuro" = 0.1,
                                "cut.1" = -0.3,
                                "cut.2" = -0.2,
                                "cut.4" = 0.5,
                                sd = 0.3),
  data = example_lasars_data,
  resp_opts = 5,
  subject_colname = "subject",
  response_colname = "response",
  latentState_colname = "subscale",
  direction_colname = "reverse",
  rev_score_id = "TRUE")
```

make_priors	<i>Make pmwg priors</i>
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Description

Creates priors for pmwg sampling

Usage

```
make_priors(
  data,
  resp_opts,
  latentState_colname,
  est_directPref = NULL,
  mu_prior = 0,
  centrePref_prior = 0,
  oddsPref_prior = 0,
  directionPref_prior = 0,
  threshold_prior = 0,
  diag_prior = 1,
  analysis = "lasars"
)
```

Arguments

<code>data</code>	A trial-wise data frame
<code>resp_opts</code>	A numeric value representing the number of response options available in the scale
<code>latentState_colname</code>	A character string representing the latent state identifier variable
<code>est_directPref</code>	A boolean value reflecting whether a <code>directionPref</code> parameter should be estimated
<code>mu_prior</code>	A numeric value representing the prior for the <code>mu</code> parameter
<code>centrePref_prior</code>	A numeric value representing the prior for the <code>centrePref_prior</code> parameter
<code>oddsPref_prior</code>	A numeric value representing the prior for the <code>oddsPref</code> parameter
<code>directionPref_prior</code>	A numeric value representing the prior for the <code>directionPref</code> parameter
<code>threshold_prior</code>	A numeric value representing the prior for the thresholds in the <code>latstat</code> model
<code>diag_prior</code>	A numeric value representing the prior for the diagonal
<code>analysis</code>	A character string taking the value of 'lasars' or 'latstat' which indicates which model variant is being used

Value

A list of priors

Examples

```
test_priors <- make_priors(data = example_lasars_data,
  resp_opts = 5,
  latentState_colname = "subscale",
  est_directPref = TRUE,
```

```

                                mu_prior = 0.5,
                                centrePref_prior = 0.3)
test_priors

```

run_lasars

Fit the lasars model

Description

Estimates latent-state and response-style parameters from Likert-scale survey data.

Usage

```

run_lasars(
  data,
  resp_opts,
  est_directPref,
  subject_colname,
  response_colname,
  latentState_colname,
  direction_colname = NULL,
  rev_score_id = NULL,
  priors = NULL,
  sampling_method = "pmwg",
  iterations = 3000,
  particles = 50,
  ...
)

```

Arguments

data	A trial-wise data frame
resp_opts	A numeric value representing the number of response options available in the scale
est_directPref	A boolean value reflecting whether an directionPref parameter should be estimated
subject_colname	A character string representing the subject identifier variable
response_colname	A character string representing the chosen Likert scale response
latentState_colname	A character string representing the latent state identifier variable
direction_colname	A character string representing the reverse-coding variable

rev_score_id	A character string representing the level of the direction variable which indicates reverse-scored items
priors	A list of priors
sampling_method	A character string which reflects the sampling approach to be taken.
iterations	A numeric value reflecting the number of sampling iterations to run
particles	A numeric value reflecting the number of proposed particles on each sampling iteration
...	Additional parameters to pass into the pmwg run_stage calls

Value

A pmwg sampled object

Examples

```
lasars_fit_result <- run_lasars(
  data = example_lasars_data,
  resp_opts = 5,
  est_directPref = TRUE,
  subject_colname = "subject",
  response_colname = "response",
  latentState_colname = "subscale",
  direction_colname = "reverse",
  rev_score_id = "TRUE",
  iterations = 100,
  particles = 10
)
```

run_latstat

Runs the latent state only model

Description

This function runs the model over the data

Usage

```
run_latstat(
  data,
  resp_opts,
  subject_colname,
  response_colname,
  latentState_colname,
  direction_colname,
```

```

    rev_score_id,
    priors = NULL,
    sampling_method = "pmwg",
    iterations = 3000,
    particles = 50,
    ...
)

```

Arguments

<code>data</code>	A trial-wise data frame
<code>resp_opts</code>	A numeric value representing the number of response options available in the scale
<code>subject_colname</code>	A character string representing the subject identifier variable
<code>response_colname</code>	A character string representing the chosen Likert scale response
<code>latentState_colname</code>	A character string representing the latent state identifier variable
<code>direction_colname</code>	A character string representing the reverse-coding variable
<code>rev_score_id</code>	A character string representing the level of the direction variable which indicates reverse-scored items
<code>priors</code>	A list of priors
<code>sampling_method</code>	A character string which reflects the sampling approach to be taken. Can take the value 'mle' or 'pmwg'.
<code>iterations</code>	A numeric value reflecting the number of sampling iterations to run
<code>particles</code>	A numeric value reflecting the number of proposed particles on each sampling iteration
<code>...</code>	Additional parameters to pass into the pmwg run_stage calls

Value

A pmwg sampled object

Examples

```

latstat_fit_result <- run_latstat(
  data = example_lasars_data,
  resp_opts = 5,
  subject_colname = "subject",
  response_colname = "response",
  latentState_colname = "subscale",
  direction_colname = "reverse",
  rev_score_id = "TRUE",
  iterations = 100,
)

```

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```
    particles = 10  
)
```

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