Package: Romeb (via r-universe)

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Type Package

Title Robust Median-Based Bayesian Growth Curve Modeling

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Description Implements robust median-based Bayesian linear growth curve models for complete data and for data with Missing Completely at Random (MCAR), Missing At Random (MAR), or Missing Not At Random (MNAR) mechanisms. Models are fitted using 'rjags' through 'JAGS' and posterior summaries are computed with 'coda'. The main function allows users to specify outcome variables, auxiliary variables for MNAR missingness models, prior hyperparameters, and initial values directly through function arguments.

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URL https://github.com/DandanTang0/Romeb

BugReports https://github.com/DandanTang0/Romeb/issues

Depends R (>= 4.2.0)

Imports coda, rjags, stats, utils

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

VignetteBuilder knitr

SystemRequirements JAGS

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LazyDataCompression xz

RoxygenNote 7.3.3

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`model` *Bayesian Linear Growth Model for Complete Data, MCAR, and MAR*

Description

JAGS model definition for the robust median-based Bayesian linear growth model used for complete data, MCAR, and MAR analyses. Prior hyperparameters are supplied through the data list by `Romeb()`.

Usage

```
model
```

Format

A character string.

model_MNAR — *Bayesian Linear Growth Model for MNAR Missingness*

Description

JAGS model definition for the robust median-based Bayesian linear growth model with an MNAR selection model. Prior hyperparameters are supplied through the data list by `Romeb()`.

Usage

```
model_MNAR
```

Format

A character string.

model_MNAR_k — *Bayesian Linear Growth Model for MNAR Missingness with Auxiliary Variables*

Description

JAGS model definition for the robust median-based Bayesian linear growth model with an MNAR selection model that includes auxiliary variables. Prior hyperparameters are supplied through the data list by `Romeb()`.

Usage

```
model_MNAR_k
```

Format

A character string.

NYS *Youth Attitudes toward Deviance (NYS, 1976–1980)*

Description

A real data set from the 1976–1980 National Youth Survey of U.S. youth.

Usage

```
NYS
```

Format

A data frame with 1,725 rows and 7 variables:

age Participant age (years)

gender Gender (0 = female, 1 = male)

Atd1 Attitude toward social deviance, wave 1

Atd2 Attitude toward social deviance, wave 2

Atd3 Attitude toward social deviance, wave 3

Atd4 Attitude toward social deviance, wave 4

Atd5 Attitude toward social deviance, wave 5

Source

National Youth Survey, waves 1976–1980 (downloadable at https://www.icpsr.umich.edu/icpsrweb/ICPSR/series/88)

Romeb *Romeb: Robust Median-Based Bayesian Linear Growth Modeling*

Description

Implements a focused robust median-based Bayesian linear growth-curve model without covariates in the growth model. The package supports complete-data, MCAR/MAR, MNAR, and MNAR-with-auxiliary-variable missing-data analyses. Auxiliary variables, when used, enter the missingness model rather than the growth model. Models are fitted via **rjags**/JAGS and summarized with **coda**.

Fits a robust median-based Bayesian linear growth curve model under complete data, MCAR/MAR, MNAR, or MNAR-with-auxiliary-variable assumptions. The current implementation fits a linear growth model without covariates in the growth model. Auxiliary variables, if supplied, are included only in the MNAR missingness model.

Usage

```
Romeb(
  Missing_Type,
  data,
  time,
  seed,
  K = 0,
  outcome_vars = NULL,
  auxiliary_vars = NULL,
  priors = list(),
  inits = NULL,
  chain = 1,
  Niter = 6000,
  burnIn = 3000,
  n_adapt = 1000
)
```

Arguments

`Missing_Type`	Character; one of `"MNAR"`, `"MAR"`, `"MCAR"`, or `"no missing"`.
`data`	Matrix or data frame containing outcome columns and, optionally, auxiliary variables.
`time`	Numeric vector of measurement times, e.g., `c(0, 1, 2, 3)`.
`seed`	Integer-valued numeric scalar used for reproducibility.
`K`	Integer; legacy argument giving the number of auxiliary variables in the first `K` columns of `data`. Prefer `outcome_vars` and `auxiliary_vars` for new analyses.
`outcome_vars`	Optional column names or column indices identifying the outcome variables. If omitted, the function uses the legacy layout implied by `K`.
`auxiliary_vars`	Optional column names or column indices identifying auxiliary variables. These variables are used only for MNAR models.
`priors`	Optional named list of prior hyperparameters. See Details.
`inits`	Optional initial values passed to `rjags::jags.model`. If omitted, chain-specific RNG initial values are generated internally.
`chain`	Integer; number of MCMC chains. Default is 1.
`Niter`	Integer; iterations per chain. Default is 6000.
`burnIn`	Integer; burn-in iterations discarded before posterior summaries are computed. Default is 3000. Must be smaller than `Niter`.
`n_adapt`	Integer; number of JAGS adaptation iterations run before posterior sampling. These iterations are not saved and are not included in posterior summaries. Default is 1000. Setting this to 0 is allowed but is generally not recommended for complex models.

Details

The default priors match the original weakly informative implementation: `muLS[j] ~ dnorm(0, 0.001)`, `pre_sigma ~ dgamma(0.001, 0.001)`, `Inv_cov ~ dwish(diag(2), 3)`, and, for MNAR models, `r0`, `r1`, `r2`, and auxiliary coefficients follow `dnorm(0, 0.001)` priors. Users can override these defaults with a named `priors` list. Unknown prior names trigger an error to avoid silently ignoring misspecified user inputs. Supported elements are `muLS_mean`, `muLS_prec`, `sigma_shape`, `sigma_rate`, `wishart_R`, `wishart_df`, `missing_coef_mean`, `missing_coef_prec`, `aux_coef_mean`, and `aux_coef_prec`. In JAGS, normal priors are parameterized by precision, not variance. The `n_adapt` argument controls JAGS adaptation only; it is separate from `burnIn`, which discards saved posterior samples during post-processing. For `Missing_Type = "no missing"`, the selected outcome variables must contain no missing values. `MCAR` and `MAR` use the same observed-data outcome model; no explicit missingness model is fitted unless `Missing_Type = "MNAR"`.

Value

An object of class `RomebResult`. The returned object is a list with the following components:

`quantiles` Posterior means, standard deviations, and quantiles with descriptive parameter labels.

`geweke` Geweke z-scores.

`credible_intervals` Equal-tail 95 percent credible intervals.

`hpd_intervals` Highest posterior density intervals.

`samps_full` The full `coda::mcmc.list` object, relabeled with descriptive parameter names.

`parameter_map` A data frame mapping descriptive parameter names to the corresponding model parameters.

`model_info` A list containing the model type, selected outcome variables, selected auxiliary variables, prior settings, and MCMC settings.

Author(s)

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See Also

Useful links:

- https://github.com/DandanTang0/Romeb
- Report bugs at https://github.com/DandanTang0/Romeb/issues

Examples

```
set.seed(123)
dat <- data.frame(
  age0 = rnorm(30),
  age1 = rnorm(30),
  age2 = rnorm(30),
```

```
  aux1 = rnorm(30)
)

time <- c(0, 1, 2)
outcome_vars <- c("age0", "age1", "age2")

head(dat)

## Not run:
fit <- Romeb(
  Missing_Type = "no missing",
  data = dat,
  time = time,
  seed = 123,
  outcome_vars = outcome_vars,
  chain = 1,
  Niter = 1000,
  burnIn = 500,
  n_adapt = 500
)
print(fit)

## End(Not run)
```

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