

Package ‘zinbcdpmm’

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Title Bayesian ZINB-Ordinal Joint Model with CDPMM Random Effects

Version 0.1.0

Description Fits a Bayesian joint model for longitudinal zero-inflated negative binomial (ZINB) and ordinal outcomes with shared random effects under a centered Dirichlet process mixture model (CDPMM) prior. Provides a blocked Gibbs sampler with Polya-Gamma (PG) and Chinese restaurant table data augmentation, plus helpers for simulation and posterior summaries based on the deviance information criterion (DIC), the widely applicable information criterion (WAIC) and the leave-one-out information criterion (LOOIC). The PG augmentation follows Polson, Scott and Windle (2013) <doi:10.1080/01621459.2013.829001>, the zero-inflated negative binomial construction follows Neelon (2019) <doi:10.1214/18-BA1132>, and the centered Dirichlet process mixture prior follows Tang, Tang and Pan (2014) <doi:10.1016/j.csda.2014.02.015>.

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URL <https://github.com/Liang-ShuQing/zinb-ordinal-cdpmm-code>

BugReports <https://github.com/Liang-ShuQing/zinb-ordinal-cdpmm-code/issues>

Encoding UTF-8

RoxygenNote 7.3.2

Depends R (>= 4.1.0)

Imports BayesLogit, mvtnorm, MCMCpack, truncnorm, loo, stats

Suggests testthat (>= 3.0.0)

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NeedsCompilation no

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fit_zinb_ordinal	<i>Fit joint ZINB-ordinal model with CDPMM random effects</i>
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Description

Thin wrapper around fit_joint_model.

Usage

```
fit_zinb_ordinal(data, chain = 2000, burn = 1000, thin = 5, G = 8, ...)
```

Arguments

data	A list / zinbcdpmm_data from simulate_zinb_ordinal or with the same fields as generate_data output.
chain	MCMC iterations.
burn	Burn-in.
thin	Thinning interval.
G	Truncation level of the stick-breaking CDPMM (default 8).
...	Additional arguments passed to fit_joint_model (e.g. iw_nu0, kappa0, r_update).

Value

An object of class zinbcdpmm_fit.

Examples

```
set.seed(1)
dat <- simulate_zinb_ordinal(n = 8, nis = 2, scenario = 1)
# Tiny chain for a quick check; use much larger chain/burn in applications.
fit <- suppressWarnings(
  fit_zinb_ordinal(dat, chain = 25, burn = 10, thin = 5, G = 2)
)
print(fit)
```

simulate_zinb_ordinal *Simulate longitudinal ZINB + ordinal data*

Description

Thin wrapper around generate_data. Returns an object of class zinbcdpmm_data.

Usage

```
simulate_zinb_ordinal(
  n = 100,
  nis = 10,
  seed = 2026,
  random_nis = FALSE,
  nis_range = 1:20,
  scenario = 1,
  C = 5,
  re_dist = "normal",
  mvt_df = 4,
  rho = NULL,
  zi_intercept = NULL,
  ...
)
```

Arguments

n	Number of subjects.
nis	Visits per subject (scalar or length-n vector).
seed	RNG seed.
random_nis	If TRUE, sample visit counts from nis_range.
nis_range	Integer range for random visit counts.
scenario	Simulation scenario (1, 2, or 3).
C	Number of ordinal categories.
re_dist	Random-effects truth: "normal", "mixture", or "mvt".
mvt_df	Degrees of freedom when re_dist = "mvt".
rho	Common RE correlation (default 0.5).
zi_intercept	Optional override of zero-inflation intercept.
...	Passed to generate_data.

Value

A list with class zinbcdpmm_data.

Examples

```
set.seed(1)
dat <- simulate_zinb_ordinal(n = 8, nis = 2, scenario = 1)
stopifnot(inherits(dat, "zinbcdpmm_data"), dat$n == 8L)
```

zinbcdpmm_fit-methods *Print and summarize zinbcdpmm fits*

Description

Print and summarize zinbcdpmm fits

Usage

```
## S3 method for class 'zinbcdpmm_fit'
print(x, ...)

## S3 method for class 'zinbcdpmm_fit'
summary(object, ...)

## S3 method for class 'summary.zinbcdpmm_fit'
print(x, digits = 3, ...)
```

Arguments

x	A zinbcdpmm_fit or its summary.
...	Unused.
object	A zinbcdpmm_fit.
digits	Digits for printing.

Value

print.zinbcdpmm_fit and print.summary.zinbcdpmm_fit invisibly return their input object (they are called for their side effect of printing to the console). summary.zinbcdpmm_fit returns an object of class summary.zinbcdpmm_fit: a list containing posterior means and 95% credible intervals for the zero-inflation (alpha), count (beta) and ordinal (gamma) fixed effects, the thresholds (delta), the negative-binomial size (r), the implied random-effects covariance Sigma and correlations Rho, and the information criteria dic, waic and looic, together with nclust_est.

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