Package: bltm (via r-universe)

September 12, 2024

Title Bayesian Latent Threshold Modeling

Version 0.1.0

Description Fits latent threshold model for simulated data and
describes how to adjust model using real data. Implements
algorithm proposed by Nakajima and West (2013)
<doi:10.1080/07350015.2012.747847>. This package has a function
to generate data, a function to configure priors and a function
to fit the model. Examples may be checked inside the
demonstration files.

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Encoding UTF-8

LazyData true

URL https://github.com/curso-r/bltm

BugReports https://github.com/curso-r/bltm/issues

Imports mvnfast, Rfast

Roxygen list(markdown = TRUE)

RoxygenNote 7.1.1

Repository https://curso-r.r-universe.dev

RemoteUrl https://github.com/curso-r/bltm

RemoteRef HEAD

RemoteSha 20304d4a789736427f05d924b9a4e8615f2dedb4

Contents

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create_prior_parameters

Create the prior parameters.

Description

Define the priors parameters to be used with `ltm_mcmc()`.

Usage

```
create_prior_parameters(
  a_mu0 = 0,
  a_s0 = 0.1,
  n0 = 6,
  S0 = 0.06,
  v0 = 6,
  V0 = 0.06,
  m0 = 0,
  s0 = 1,
  a0 = 20,
  b0 = 1.5
)
```

Arguments

a_mu0	mean of alpha normal distribution.
a_s0	standard deviation of alpha's normal distribution.
n0	sig2 inverse gamma shape parameter.
S0	sig2 inverse gamma location parameter.
v0	sig_eta inverse gamma shape parameter.
V0	sig_eta inverse gamma location parameter.
m0	mu normal's mean parameter.
s0	mu normals standard deviation.
a0	a0 beta's shape parameter.
b0	a0 beta's location parameter.

Details

Considering the following priors:

- alpha ~ N(mu0, s0)
- sig2 ~ IG(n0/2, S0/2)
- sig_eta ~ IG(v0/2, V0/2)
- mu ~ N(m0, s0^2)
- (phi+1)/2 ~ Beta(a0, b0)

Value

List containing the hyperparameters used to fit the model. The default parameters are the same of the simulation example of the paper.

References

Nakajima, Jouchi, and Mike West. "Bayesian analysis of latent threshold dynamic models." Journal of Business & Economic Statistics 31.2 (2013): 151-164.

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ltm_mcmc   *MCMC LTM*

Description

Given x and y performs the MCMC optimization.

Usage

```
ltm_mcmc(
  x,
  y,
  burnin = 2000,
  iter = 8000,
  K = 3,
  prior_par = create_prior_parameters()
)
```

Arguments

x	data points
y	response variable
burnin	number of burnin iterations
iter	number of iterations after burnin
K	parameter K
prior_par	List of parameters for prior distrributions. See create_prior_parameters().

Value

matrix containing the posterior samples. Each line is one sample after the burnin period and each column is one of the parameters of the model. Columns are named to find the parameters with ease.

References

Nakajima, Jouchi, and Mike West. "Bayesian analysis of latent threshold dynamic models." Journal of Business & Economic Statistics 31.2 (2013): 151-164.

Examples

```
# Generates 10 series, each one with 500 observations and 2 regressors.

d_sim <- ltm_sim(
  ns = 500, nk = 2, ni = 10,
  vmu = matrix(c(.5,.5), nrow = 2),
  mPhi = diag(2) * c(.99, .99),
  mSigs = c(.1,.1),
  dsig = .15,
  vd = matrix(c(.4,.4), nrow = 2),
  alpha = 0
)

# Fit model

fit_model <- ltm_mcmc(d_sim$mx, d_sim$vy, burnin = 0, iter = 2)
```

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ltm_sim   *Simulate LTM model*

Description

Simulate LTM model using many

Usage

```
ltm_sim(ns, nk, ni, vmu, mPhi, mSigs, dsig, vd, alpha)
```

Arguments

ns	number of times
nk	number of covariates
ni	number of series
vmu	vector mu
mPhi	phi diagonal matrix with the parameters
mSigs	sigma eta vector
dsig	general sigma
vd	threshold parameter
alpha	intercept

Value

List containing the generated y, x, beta and thresholded beta.

References

Nakajima, Jouchi, and Mike West. "Bayesian analysis of latent threshold dynamic models." Journal of Business & Economic Statistics 31.2 (2013): 151-164.

Examples

```
# Generates 10 series, each one with 500 observations and 2 regressors.

d_sim <- ltm_sim(
  ns = 500, nk = 2, ni = 10,
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  mSigs = c(.1,.1),
  dsig = .15,
  vd = matrix(c(.4,.4), nrow = 2),
  alpha = 0
)

str(d_sim)
```

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