Package 'Rlgt'

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Description An implementation of various Bayesian Exponential Smoothing models as described in the paper by Smyl.These models include LGT (Local-Global Trend), SGT (Seasonal Global Trend), and their variations. The Bayesian model fitting is based on RStan package.

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Depends R (>= 3.0.2), Rcpp (>= 0.12.8), methods, rstantools

Imports rstan (>= 2.13.2), sn, forecast

LinkingTo StanHeaders (>= 2.13.1), rstan (>= 2.13.2), BH (>= 1.62.0.1), Rcpp (>= 0.12.8), RcppEigen (>= 0.3.2.9.0)

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R topics documented:

Rlgt2-package *Getting started with the Rlgt package*

Description

An implementation of LGT and SGT models as described in ...

Author(s)

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Examples

```
x <- 1
```

fit.lgt *Runs the model fitting*

Description

Runs the model fitting

Usage

```
fit.lgt(y, model = c("LGT", "SGT", "LGTe", "SGTe", "Trend"),
  control = lgt.control(), nChains = 2, nCores = 2, addJitter = TRUE,
  verbose = FALSE)
```

Arguments

y	the time series
model	a stan model
control	control arguments list
nChains	number of MCMC chains . Must >=1. Perhaps optimal number is 4.
nCores	number of cores to be used. For performance reasons it should be equal to nChains, but nChains should be smaller or equal to the number of cores on the computer.
addJitter	adding a bit of jitter is helping Stan in case of some flat series
verbose	print verbose information yes/no

Value

lgtModel

`forecast.lgt` *produce forecasts*

Description

This function produces forecasts from a model

Usage

```
## S3 method for class 'lgt'
forecast(object, h = ifelse(frequency(object$x) > 1, 2 *
  frequency(object$x), 10), level = c(80, 95), NUM_OF_TRIALS = 2000,
  MIN_VAL = 0.001, MAX_VAL = 1e+38, ...)
```

Arguments

`object`	lgt object
`h`	Forecasting horizon (10 for annual and 2*periods otherwise)
`level`	Confidence levels for prediction intervals a.k.a. coverage percentiles. Beween 0 and 100.
`NUM_OF_TRIALS`	Number of simulations to run. Suggested rannge (1000,5000), but it may have to be higher for good coverage of very high levels, e.g. 99.8.
`MIN_VAL`	Minimum value the forecast can take. Must be positive.
`MAX_VAL`	Maximum value the forecast can take.
`...`	description

Value

returns a forecast object compatible with the forecast package

Author(s)

bergmeir

`initModel` *Initialize a non-seasonal LGT stan model*

Description

Initialize a stan model that uses the (non-seasonal) LGT

Usage

```
initModel(modelType = NULL)
```

Arguments

modelType	type of the forecasting model selected

Value

SkeletonModel

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lgt *lgt class*

Description

a constructor function for the "lgt" class

Usage

```
lgt(y, lgtmodel, params, paramMean, seasonality, samples)
```

Arguments

y	the time series data
lgtmodel	type of lgtmodel selected
params	list of parameters
paramMean	mean of each parameter
seasonality	number of seasons, 1 for annual
samples	stanfit object representing the MCMC samples

Value

lgt instance

---

lgt.control *Sets and initializes the main parameters of the algorithm*

Description

This is a function that initializes and sets the parameters of the algorithm. It generates a list of parameters, to be used with the fit.lgt function.

Usage

```
lgt.control(MAX_RHAT_ALLOWED = 1.005, NUM_OF_ITER = 2500,
  MAX_NUM_OF_REPEATS = 3, CAUCHY_SD_DIV = 200, MIN_SIGMA = 0.001,
  MIN_NU = 2, MAX_NU = 20, MIN_POW_TREND = -0.5, MAX_POW_TREND = 1,
  POW_TREND_ALPHA = 1, POW_TREND_BETA = 1, POW_SIGMA_ALPHA = 1,
  POW_SIGMA_BETA = 1, ADAPT_DELTA = 0.9, MAX_TREE_DEPTH = 11,
  SEASONALITY = 1, SKEW = 0)
```

Arguments

`MAX_RHAT_ALLOWED`
: Maximum average Rhat that suggests a good fit, see Stan's manual. Suggested range(1.005,1.02), see also MAX_NUM_OF_REPEATS description below.

`NUM_OF_ITER`
: Number of iterations for each chain. Suggested range(1000,5000). Generally, the longer the series, the smaller the vallue will do. See also MAX_NUM_OF_REPEATS description below.

`MAX_NUM_OF_REPEATS`
: Maximum number of the sampling procedure repeats if the fit is unsatisfactorily (avgRHat>MAX_RHAT_ALLOWED). Each round doubles the number of iterations. Suggested range(2,4)

`CAUCHY_SD_DIV`
: For parameters with non-obvious range Cauchy distribution is used. The error size of this distribution is calculated by dividing max value of the time series by this constant. Suggested range(100,300)

`MIN_SIGMA`
: Minimum size of the fitted sigma, applied for numerical stability. Must bve positive.

`MIN_NU`
: Minimum degrees of freedom of the Student's distribution, that is used in most models. Suggested range(1.2, 5)

`MAX_NU`
: Maximum degrees of freedom of the Student's distribution. Suggested range(15,30)

`MIN_POW_TREND`
: Minimum value of power of trend coefficient. Suggested range(-1,0)

`MAX_POW_TREND`
: Maximum value of power of trend coefficient. It should stay 1 to allow the model to approach exponential growth when needed.

`POW_TREND_ALPHA`
: Alpha parameter of Beta distribution that is the prior of the power coefficient in the formula of trend parameter. To make the forecast more curved, make it larger. Suggested range(1,6)

`POW_TREND_BETA`
: Beta parameter of Beta distribution that is the prior of the power of trend parameter. 1 by default, see also above.

`POW_SIGMA_ALPHA`
: Alpha parameter of Beta distribution that is the prior of the power coefficient in the formula of the error size. 1 by default, see also below.

`POW_SIGMA_BETA`
: Beta parameter of Beta distribution that is the prior of the power coefficient in the formula of the error size. If the powSigma fitted is considered too often too high (i.e.> 0.7) you can attempt to tame it down by increasing POW_SIGMA_BETA. Suggested range(1,4). ADAPT_DELTA Target Metropolis acceptance rate. See Stan manual. Suggested range (0.8-0.97). MAX_TREE_DEPTH NUTS maximum tree depth. See Stan manual. Suggested range (10-12).

ADAPT_DELTA	Description Setting it negative makes negative innovations having smaller impact on the fitting than the positive ones, which would have the effect of making a model "more optimistic". Suggested range (-0.5, 0.5).
MAX_TREE_DEPTH	Description
SEASONALITY	E.g. 12 for monthly seasonality. 1 for non-seasonal models
SKEW	Skew of error distribution used by manually-skewed models. 0 be default.

Value

list of control parameters

`posterior_interval.lgt` *lgt posterior interval*

Description

This is a method of lgt object to produce posterior interval

Usage

```
## S3 method for class 'lgt'
posterior_interval(object, prob = 0.9, type = "central", ...)
```

Arguments

object	an object of class lgt
prob	percentile level to be generated (multiple values can be accepted as a vector)
type	currently only central is available
...	currently not in use

Value

confidence interval

Author(s)

wibowo

print.lgt *Generic print function for lgt models*

Description

Print out some characteristics of a lgt model.

Usage

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

Arguments

x	the lgt model
...	additional function parameters (currently not used)

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