

Package ‘RGENERATE’

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Title Tools to Generate Vector Time Series

Type Package

Description A method 'generate()' is implemented in this package for the random generation of vector time series according to models obtained by 'RMAWGEN', 'vars' or other packages. This package was created to generalize the algorithms of the 'RMAWGEN' package for the analysis and generation of any environmental vector time series.

Repository CRAN

URL <https://github.com/ecor/RGENERATE>

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Depends R (>= 3.5.0),RMAWGEN,magrittr

Imports vars

Suggests knitr,rmarkdown,testthat

RoxygenNote 7.3.2

VignetteBuilder knitr

NeedsCompilation no

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 gapFilling

gapFilling

Description

It fills in a gap of a data frame by using [generate](#) method

Usage

```
gapFilling(x = NULL, ...)

## Default S3 method:
gapFilling(x, objectForGeneration = NULL, ...)

## S3 method for class 'data.frame'
gapFilling(
  x,
  objectForGeneration = NULL,
  max.filling = 2,
  nofill.code = -9999,
  ...
)
```

Arguments

| | |
|----------------------------------|---|
| <code>x</code> | object with gaps to fill |
| <code>...</code> | further argument for generate method |
| <code>objectForGeneration</code> | object used for generate method |
| <code>max.filling</code> | integer values: gap are filled if the previous <code>max.filling</code> values are not NA or <code>nofill.code</code> |
| <code>nofill.code</code> | Alternative value to NA which indicates the gaps which are not filled |

Examples

```
set.seed(122)
NSTEP <- 1000
x <- rnorm(NSTEP)
y <- x+rnorm(NSTEP)
z <- c(rnorm(1),y[-1]+rnorm(NSTEP-1))
df <- data.frame(x=x,y=y,z=z)
var <- VAR(df,type="none")

dfobs <- df
dfobs[20:30,2] <- NA
n <- nrow(df)
gp <- gapFilling(x=dfobs,objectForGeneration=var,max.filling=2)
```

generate

generate

Description

It generates a multivariate random series according to the model x

Usage

```
generate(x = NULL, ...)
```

```
## Default S3 method:
```

```
generate(  
  x,  
  FUN = rnorm,  
  n = 100,  
  K = 3,  
  names = NULL,  
  cov = NULL,  
  gap.filling = NULL,  
  ...  
)
```

```
## S3 method for class 'varest'
```

```
generate(  
  x,  
  FUN = rnorm,  
  n = 100,  
  names = NULL,  
  noise = NULL,  
  exogen = NULL,  
  xprev = NULL,  
  gap.filling = NULL,  
  ...  
)
```

```
## S3 method for class 'varest2'
```

```
generate(  
  x,  
  FUN = rnorm,  
  n = 100,  
  ...  
)
```

```

    names = NULL,
    noise = NULL,
    exogen = NULL,
    xprev = NULL,
    gap.filling = NULL,
    ...
)

## S3 method for class 'GPCAvarest2'
generate(
  x,
  FUN = rnorm,
  n = 100,
  names = NULL,
  noise = NULL,
  exogen = NULL,
  xprev = NULL,
  extremes = TRUE,
  type = 3,
  gap.filling = NULL,
  GPCA.row.gap.filling.option = TRUE,
  ...
)

## S3 method for class 'matrix'
generate(
  x,
  FUN = rnorm,
  n = 100,
  noise = NULL,
  xprev = NULL,
  names = NULL,
  gap.filling = NULL,
  type = c("autoregression", "covariance"),
  ...
)

## S3 method for class 'list'
generate(x, factor.series = names(x), n = NA, ...)

## S3 method for class 'MonthlyList'
generate(x, origin, n, ...)

```

Arguments

`x` null object or the model used for random generation , e.g. a VAR model as a [varest-class](#) (returned by [VAR](#)) or [varest2-class](#) object. Default is NULL.

`...` further arguments for FUN

| | |
|--|--|
| <code>FUN</code> | random function of the probability distribution used for noise random generation. Default is <code>rnorm</code> . See https://CRAN.R-project.org/view=Distributions |
| <code>n</code> | number of generations requested |
| <code>K</code> | number of the variables to be generated simultaneously, i.e. the K parameters of a VAR. It is automatically detected by <code>x</code> , <code>names</code> or <code>cov</code> , if one of these is not NULL. |
| <code>names</code> | null object or string vectors or names of the variables to be generated simultaneously. Default is NULL. |
| <code>cov</code> | null object or covariance matrix of the random variables to be generated simultaneously. Default is NULL, not used in case this information can be detected from <code>x</code> . |
| <code>gap.filling</code> | data frame with time series with gabs (NA values) to be filled. Default is NULL and not considered, otherwise the method returns this data frame with NA row replaced with generated (e.g auto-regressed) values. |
| <code>noise</code> | null object or a generic external noise for <code>x</code> model residuals, e.g. standard white noise, for random generation with the model <code>x</code> . Default is NULL. If NULL the noise is automatically calculated. |
| <code>exogen</code> | null object or amatrix or data frame with exogeneous variables (predictors) id requested by <code>x</code> . Default is NULL |
| <code>xprev</code> | null object or initial condition of the multivariate random process to be generated. Default is NULL. |
| <code>extremes</code> | see inv_GPCA |
| <code>type</code> | character string used in some method implementations. See inv_GPCA . In the matrix implementation, default is "autoregression", i.e. the matrix is used as a vector auto-regression coefficient, if it is "covariance" the method generated a sample with covariance matrix given by <code>x</code> . |
| <code>GPCA.row.gap.filling.option</code> | logical value. Default is TRUE. In case of GPCAvarest2-class objects, If <code>gap.filling</code> contains both NA and finite values in the same row, this row will contains all NA values after GPCA. In this case all row values are generated through auto-regression. If <code>GPCA.row.gap.filling.option</code> all insterted non-NA <code>gap.filling</code> values are replced before returning the function value. Otherwise, in the rows with NAs all values are re-generated. The option TRUE is not safe in case the gaps are vary long because the generated values is used for subsequent auto-regrossion. |
| <code>factor.series</code> | factor series used by 'factor.series' |
| <code>origin</code> | start date for generation. See adddate |

Value

a matrix or a data frame object

See Also

[getVARmodel](#)

Examples

```

library(RGENERATE)

set.seed(122)
NSTEP <- 1000
x <- rnorm(NSTEP)
y <- x+rnorm(NSTEP)
z <- c(rnorm(1),y[-1]+rnorm(NSTEP-1))
df <- data.frame(x=x,y=y,z=z)
var <- VAR(df,type="none")
gg <- generate(var,n=20)

cov <- cov(gg)

ggg <- generate(FUN=rnorm,n=NSTEP,cov=cov)

library(RMAWGEN)
exogen <- as.data.frame(x+5)
gpcavar <- getVARmodel(data=df,suffix=NULL,p=3,n_GPCA_iteration=5,
n_GPCA_iteration_residuals=5,exogen=exogen)
gpcagg <- generate(gpcavar,n=20,exogen=exogen)

## Generate an auto-regressive time-series with a generic matrix

A <- diag(c(1,-1,1))
mgg <- generate(A,n=100)

### Gap Filling Examples

dfobs <- df
dfobs[20:30,] <- NA
n <- nrow(df)
dffill <- generate(gpcavar,n=n,exogen=exogen,gap.filling=dfobs,names=names(dfobs))

qqplot(dfobs$y,dffill$y)
abline(0,1)

### Gap filling with matrix

mgg_n <- mgg
mgg_n[20:30,2] <- NA

mgg_nfill <- generate(A,gap.filling=mgg_n)

print(mgg_n[1:31,])
print(mgg_nfill[1:31,])

dfobs2 <- df

```

```
dfobs2[20:30,2] <- NA
n <- nrow(df)
dffill2 <- generate(gpcavar,n=n,exogen=exogen,gap.filling=dfobs2,names=names(dfobs2))

qqplot(dfobs$y,dffill$y)
abline(0,1)

### generation with 'generation.matrix'
### and matrix 'x' is a covariance matrix

covariance <- array(0.5,c(3,3))

diag(covariance) <- 1

set.seed(127)
ngns <- 1000
gg1 <- generate(FUN=rnorm,n=ngns,cov=covariance)
set.seed(127)
gg2 <- generate(covariance,type="covariance",n=ngns)

## generate with a list of covariance matrix
ndim <- 5
dim <- c(ndim,ndim)
CS1 <- array(0.3,dim)
CS2 <- array(0.5,dim)
CS3 <- array(0.7,dim)
CS4 <- array(0.1,dim)

diag(CS1) <- 1
diag(CS2) <- 1
diag(CS3) <- 1
diag(CS4) <- 1

list <- list(CS1=CS1,CS2=CS2,CS3=CS3,CS4=CS4)

series <- rep(1:4,times=4,each=100)
series <- sprintf("CS%d",series)
names_A <- sprintf("A%d",1:ndim)
ggs <- generate(list,factor.series=series,FUN=rnorm,type="covariance",names=names_A)

ggs_CS1 <- ggs[series=="CS1",]
cov(ggs_CS1)

ggs_CS3 <- ggs[series=="CS3",]
cov(ggs_CS3)
```

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