Package 'WaveletArima'

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Type Package

Title Wavelet-ARIMA Model for Time Series Forecasting

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Description Noise in the time-series data significantly affects the accu-
racy of the ARIMA model. Wavelet transformation decomposes the time series data into sub-
components to reduce the noise and help to improve the model performance. The wavelet-
ARIMA model can achieve higher prediction accuracy than the tradi-
tional ARIMA model. This package provides Wavelet-ARIMA model for time series forecast-
ing based on the algorithm by Aminghafari and Poggi (2012) and Paul and An-
joy (2018) <doi:10.1142/S0219691307002002> <doi:10.1007/s00704-017-2271-x>.

License GPL-3

Encoding UTF-8

RoxygenNote 7.2.0

Imports stats, wavelets, fracdiff, forecast

NeedsCompilation no

Repository CRAN

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R topics documented:

WaveletFitting	*Wavelet Transform Using Maximal Overlap Discrete Wavelet Transform (MODWT) Algorithm*

Description

Transforms the time series data by using hybrid MODWT algorithm.

Usage

```
WaveletFitting(
  ts,
  WFilter = "haar",
  Wvlevels,
  bndry = "periodic",
  FFlag = TRUE
)
```

Arguments

ts	Univariate time series
WFilter	Wavelet filter use in the decomposition
Wvlevels	The level of wavelet decomposition
bndry	The boundary condition of wavelet decomposition:'periodic' or 'reflection'
FFlag	The FastFlag condition of wavelet decomposition: True or False

Value

- WaveletSeries - The wavelet trasnform of the series

References

- Aminghafari, M. and Poggi, J.M. 2007. Forecasting time series using wavelets. Internationa Journal of Wavelets, Multiresolution and Inforamtion Processing, 5, 709 to 724
- Percival D. B. and Walden A. T. 2000. Wavelet Methods for Time-Series Analysis. Cambridge Univ. Press, U.K.
- Paul R. K., Prajneshu and Ghosh H. 2013. Wavelet Frequency Domain Approach for Modelling and Forecasting of Indian Monsoon Rainfall Time-Series Data. Journal of the Indian society of agricultural statistics, 67, 319 to 327.

Examples

```
data<-rnorm(100,mean=100,sd=50)
WaveletFitting(ts=data,Wvlevels=3,WFilter='haar',bndry='periodic',FFlag=TRUE)
```

WaveletFittingarma | *Wavelet-ARIMA hybrid model for forecasting*

Description

Fits the time series data by using hybrid Wavelet-ARIMA algorithm.

Usage

```
WaveletFittingarma(
  ts,
  filter = "haar",
  Waveletlevels,
  boundary = "periodic",
  FastFlag = TRUE,
  MaxARParam,
  MaxMAParam,
  NForecast
)
```

Arguments

ts	univariate time series
filter	Wavelet filter use in the decomposition
Waveletlevels	The level of wavelet decomposition
boundary	The boundary condition of wavelet decomposition
FastFlag	The FastFlag condition of wavelet decomposition: True or False
MaxARParam	The maximum AR order for auto.arima
MaxMAParam	The maximum MA order for auto.arima
NForecast	The forecast horizon: A positive integer

Value

- Finalforecast - Forecasted value
- FinalPrediction - Predicted value of train data

References

- Aminghafari, M. and Poggi, J.M. 2012. Nonstationary time series forecasting using wavelets and kernel smoothing. Communications in Statistics-Theory and Methods, 41(3),485-499.
- Paul, R.K. A and Anjoy, P. 2018. Modeling fractionally integrated maximum temperature series in India in presence of structural break. Theory and Applied Climatology 134, 241–249.

Examples

```
N <- 100
PHI <- 0.2
THETA <- 0.1
SD <- 1
M <- 0
D <- 0.2
Seed <- 123
set.seed(Seed)
Sim.Series <- fracdiff::fracdiff.sim(n = N,ar=c(PHI),ma=c(THETA),d=D,rand.gen =rnorm,sd=SD,mu=M)
simts <- as.ts(Sim.Series$series)
WaveletForecast<-WaveletFittingarma(ts=simts,filter ='la8',Waveletlevels=floor(log(length(simts))),
MaxARParam=5,MaxMAParam=5,NForecast=5)
```

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