Package 'WaveletArima'

July 2, 2022

Type Package

Title Wavelet-ARIMA Model for Time Series Forecasting

Version 0.1.2

Author Dr. Ranjit Kumar Paul [aut, cre],
Mr. Sandipan Samanta [aut],
Dr. Md Yeasin [aut]

Maintainer Dr. Ranjit Kumar Paul <ranjitstat@gmail.com>

Description Noise in the time-series data significantly affects the accuracy of the ARIMA model. Wavelet transformation decomposes the time series data into subcomponents to reduce the noise and help to improve the model performance. The wavelet-ARIMA model can achieve higher prediction accuracy than the traditional ARIMA model. This package provides Wavelet-ARIMA model for time series forecasting based on the algorithm by Aminghafari and Poggi (2012) and Paul and Anjoy (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

Date/Publication 2022-07-02 21:50:08 UTC

R topics documented:

WaveletFitting 2
WaveletFittingarma 3

Index **5**

`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)
```

Index

WaveletFitting, 2
WaveletFittingarma, 3