

# Package ‘TSF’

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**Type** Package

**Title** Two Stage Forecasting (TSF) for Long Memory Time Series in Presence of Structural Break

**Version** 0.1.1

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**Description** Forecasting of long memory time series in presence of structural break by using TSF algorithm by Papailias and Dias (2015) <doi:10.1016/j.ijforecast.2015.01.006>.

**License** GPL

**Imports** stats, fracdiff, forecast

**LazyData** TRUE

**NeedsCompilation** no

**Repository** CRAN

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forecastTSF	<i>Forecasting fractionally differenced series using TSF approach</i>
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## Description

The function is used for forecasting long memory time series using TSF approach

**Usage**

```
forecastTSF(N0,Xt,bandwidth)
```

**Arguments**

N0	lead period of forecast
Xt	univariate time series
bandwidth	the bandwidth used in the regression equation

**Value**

forecastTSF	the predicted values, the out of sample forecasts and the values of long memory parameter
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**Author(s)**

Sandipan Samanta, Ranjit Kumar Paul and Dipankar Mitra

**References**

Papailias, F. and Dias, G. F. 2015. Forecasting long memory series subject to structural change: A two-stage approach. *International Journal of Forecasting*, 31, 1056 to 1066.

Wang, C. S. H., Bauwens, L. and Hsiao, C. 2013. Forecasting a long memory process subject to structural breaks. *Journal of Econometrics*, 177, 171-184.

Reisen, V. A. (1994) Estimation of the fractional difference parameter in the ARFIMA(p,d,q) model using the smoothed periodogram. *Journal Time Series Analysis*, 15(1), 335 to 350.

**Examples**

```
## Simulating Long Memory Series
N <- 1000
PHI <- 0.2
THETA <- 0.1
SD <- 1
M <- 0
D <- 0.2
Seed <- 123
N0<-9
bandwidth<-0.9
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)

Xt <- as.ts(Sim.Series$series)

## Forecasting using TSF method
forecastTSF (N0,Xt,bandwidth)
```

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StructuralBrekwithLongmemory

*Predicting fractionally differenced series in presence of structural break*

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### Description

The function is used for prediction of long memory time series in presence of structural break

### Usage

```
StructuralBrekwithLongmemory(ts, bandwidth)
```

### Arguments

ts	univariate time series
bandwidth	the bandwidth used in the regression equation

### Value

StructuralBrekwithLongmemory  
the updated series at first step of TSF approach, prediction based on TSF approach and the estimate of long memory parameter

### Author(s)

Sandipan Samanta, Ranjit Kumar Paul and Dipankar Mitra

### References

- Papailias, F. and Dias, G. F. 2015. Forecasting long memory series subject to structural change: A two-stage approach. *International Journal of Forecasting*, 31, 1056 to 1066.
- Wang, C. S. H., Bauwens, L. and Hsiao, C. 2013. Forecasting a long memory process subject to structural breaks. *Journal of Econometrics*, 177, 171-184.
- Reisen, V. A. (1994) Estimation of the fractional difference parameter in the ARFIMA(p,d,q) model using the smoothed periodogram. *Journal Time Series Analysis*, 15(1), 335 to 350.

### Examples

```
## Simulating Long Memory Series
N <- 1000
PHI <- 0.2
THETA <- 0.1
SD <- 1
M <- 0
D <- 0.2
Seed <- 123
bandwidth<-0.9
```

```

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)

Xt <- as.ts(Sim.Series$series)

## Forecasting using TSF method
StructuralBrekwithLongmemory(Xt,bandwidth)

```

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TSF

*Fractionally differenced series for any value of d*


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### Description

The function `fdseries` computes the fractional differenced series for any value of  $d$  i.e. positive or negative.

### Usage

```
fdseries(x, d)
```

### Arguments

<code>x</code>	univariate time series
<code>d</code>	The order of fractional differencing to be done

### Value

<code>fdseries</code>	fractionally differenced series for both positive as well as negative $d$
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### Author(s)

Sandipan Samanta, Ranjit Kumar Paul and Dipankar Mitra

### References

Papailias, F. and Dias, G. F. 2015. Forecasting long memory series subject to structural change: A two-stage approach. *International Journal of Forecasting*, 31, 1056 to 1066.

Wang, C. S. H., Bauwens, L. and Hsiao, C. 2013. Forecasting a long memory process subject to structural breaks. *Journal of Econometrics*, 177, 171-184.

Reisen, V. A. (1994) Estimation of the fractional difference parameter in the ARFIMA(p,d,q) model using the smoothed periodogram. *Journal Time Series Analysis*, 15(1), 335 to 350.

**Examples**

```
## Simulating Long Memory Series
N <- 1000
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)

Xt <- as.ts(Sim.Series$series)

## fractional differencing
fdseries(Xt,d=D)
```

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