'LakeHuron' dataset

10/10 points (100.00%)

Quiz, 10 questions

✓ Congratulations! You passed!

Next Item



1/1 points

1

This Quiz has questions that are related steps to model a time series titled 'LakeHuron' in 'datasets' package in R.

In the following code, we look at the dataset:



Which one of the following is plausible?



There is a downward trend in the time series.

Correct

Correct!

If we employ simple linear regression, the slope of the regression line would be negative.

- There is no trend at all in the time series.
- There is an upward trend in the time series.



1 / 1 points

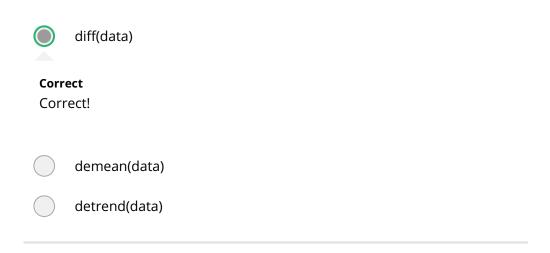
2.

How one can remove the trend (i.e. de-trend) the time series 'LakeHuron' in R?

You can use the code block below to check your answer. $\label{eq:lakehuron} \mbox{'LakeHuron'} \ \ dataset$ 10/10 points (100.00%)

Quiz, 10 questions

<pre>data<- LakeHuron plot(diff(data)) # Edit this line</pre>	Run	
	Reset	

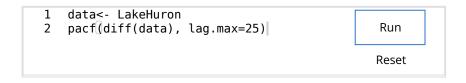




1/1 points

3.

Find the PACF of the differenced time series in a code block below.



Which lags are significant?



Correct

Correct!

Both partial autocorrelation coefficients barely exceed the 95% confidence intervals.

None

'LakeHuron' dataset

10/10 points (100.00%)

Quiz, 10 questions



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1 / 1 points

4.

If we ignore the significant partial autocorrelation coefficient at a higher lag, what would significant partial autocorrelation coefficient at a lower lag suggests?

- It suggests that AR(20) model might be suitable for this time series.
- It suggests that MA(2) model might be suitable for this time series.
- It suggests that AR(2) model might be suitable for this time series.

Correct

Correct!

AR(2) theoretically has PACF that cuts off at lag 2.



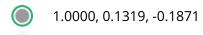
1/1 points

5.

Find the first three autocorrelation coefficients of the differenced time series using the code block below.

```
1 data<- diff(LakeHuron)
2 c = acf(data, plot=F)$acf[1:3]
3 c Run
Reset</pre>
```

0.1319, -0.1871, -0.2035



Correct

Correct!

'LakeHuron' dataseto, 0.1319 -0.2081

10/10 points (100.00%)

Quiz, 10 questions



1/1 points

6.

We start fitting an AR model to the time series 'LakeHuron'. What is the matrix R in Yule-Walker estimation if we are fitting an AR(2) model?



$$\begin{bmatrix} 0.1319 & -0.1871 \\ -0.1871 & 0.1319 \end{bmatrix}$$



$$\begin{bmatrix} 1.000 & 0.1319 \\ 0.1319 & 1.000 \end{bmatrix}$$



Correct

Correct!

Diagonal always consist of 1's.



$$\begin{bmatrix} 1.000 & 0.1319 & -0.1871 \\ 0.1319 & 1.000 & 0.1319 \\ -0.1871 & 0.1319 & 1.000 \end{bmatrix}$$



1/1 points

7.

In the code block below, estimate the coefficients of the AR(2) model we are fitting to the time series 'LakeHuron'. Some lines of the code are provided, and

'LakeHuron's datasetsing.

10/10 points (100.00%)

Quiz, 10 questions

```
R=matrix(1,2,2) # matrix of dimension 2 by 2, with entries all 1's.
 2
   r[1:2]=acf(diff(LakeHuron), plot=F)$acf[2:3]
 3
    R[1,2]=r[1] # only diagonal entries are edited
   R[2,1]=r[1] # only diagonal entries are edited
    b=matrix(r,nrow=2,ncol=1)
 7
8
9
10
    # Continue with a routine here to find the coefficients of the fitted
      model. See parameter estimation in this lesson for heup.
11
12
    phi=solve(R,b)
                                                           Reset
13
    phi
```



$$\hat{\phi}_1 = 0.1594, \hat{\phi}_2 = -0.2081$$

Correct

$$\hat{\phi}_1 = 0.1319, \hat{\phi}_2 = -0.1871$$

$$\hat{\phi}_1 = 1.0000, \hat{\phi}_2 = 0.1319$$



1/1 points

8.

Estimate the variance of the noise in the model in the code block below.

Quiz, 10 questions

```
LakeHuron datasetrix(1,2,2) # matrix of dimension 2 by 2, with entries 10/10/points (100.00%)
                        r[1:2]=acf(diff(LakeHuron), plot=F)$acf[2:3]
                        R[1,2]=r[1] # only diagonal entries are edited
                     5
                        R[2,1]=r[1] # only diagonal entries are edited
                     6
                     7
                        b=matrix(r,nrow=2,ncol=1)
                     8
                    9
                        phi.hat<-solve(R,b)</pre>
                    10
                        phi.hat
                    11
                    12
                        c0=acf(diff(LakeHuron), type='covariance', plot=F)$acf[1]
                    13
                        # Calculate the variance of teh noise below. See estimation lectures
                   14
                          in this lesson for help.
                    15
                        var.hat=c0*(1-sum(phi.hat*r))
                    16
                        var.hat
                                                                        Reset
                    17
```

0.1319

0.5220

Correct

Correct!

0.1594

0.7225



1/1 points

Let X_t =LakeHuron and Y_t =diff(LakeHuron). Which one of the following is the fitted model for Y_t ?

$$Y_t = 0.1594Y_{t-1} - 0.2081Y_{t-2} + Z_t$$

where Z_t ~ Normal (0, 0.5220).



 $Y_t = 0.1594Y_{t-1} - 0.2081Y_{t-2} + Z_t$

where Z_{t} ~ Normal (0,0.7225)

'LakeHuron' dataset Un-selected is correct

10/10 points (100.00%)

Quiz, 10 questions

$$Y_t = 0.1319Y_{t-1} - 0.1871Y_{t-2} + Z_t$$
 where Z_t ~ Normal $(0,0.5220).$

Un-selected is correct

$$(1-0.1594B+0.2081B^2)Y_t=Z_t$$
 where $Z_t extstyle\sim$ Normal $(0,0.7225^2).$

Un-selected is correct



1/1 points

10.

Let X_t =LakeHuron and Y_t =diff(LakeHuron). Which one of the following is the fitted model for X_t ?

$$X_t = 1.1594X_{t-1} - 0.3675X_{t-2} + 0.2081X_{t-3} + Z_t$$

where Z_t ~ Normal (0, 0.5220).

Correct

$$X_t = 0.1594 X_{t-1} - 0.2081 X_{t-2} + Z_t$$
 where Z_t ~ Normal $(0,0.5220).$

Un-selected is correct

$$(1-0.1594B+0.2081B^2)(1-B)X_t=Z_t$$
 where $Z_t simes$ Normal $(0,0.7225^2).$

Correct

'LakeHuron' dataset

10/10 points (100.00%)

Quiz, 10 questions





