'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:

```
1  LakeHuron
2  plot(LakeHuron)
```

Run

Reset

Which one of the following is plausible?

- [x] 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.

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10/10 points (100.00%)

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.

```
1  data<- LakeHuron
2  plot(diff(data)) # Edit this line
```

Run

Reset

- [x] diff(data)

Correct
Correct!

- [ ] demean(data)
- [ ] detrend(data)

1 / 1 points

3.
Find the PACF of the differenced time series in a code block below.

```
1  data<- LakeHuron
2  pacf(diff(data), lag.max=25)
```

Run

Reset

Which lags are significant?

- [ ] lag 2
- [x] lag 2 and lag 20

Correct
Correct!

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

None

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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

- 0.1319, -0.1871, -0.2035
- 1.0000, 0.1319, -0.1871

Correct

Correct!

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1.000, 0.1319 -0.2081

10/10 points (100.00%)

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.

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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 some are missing.

10/10 points (100.00%)

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

Run

Reset

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

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.

'LakeHuron' dataset

Quiz, 10 questions

10/10 points (100.00%)

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

```
R=matrix(1,2,2) # matrix of dimension 2 by 2, with entries all 1's
r=NULL
r[1:2]=acf(diff(LakeHuron), plot=F)$acf[2:3]
R[1,2]=r[1] # only diagonal entries are edited
R[2,1]=r[1] # only diagonal entries are edited
R
b=matrix(r,nrow=2,ncol=1)
b
phi.hat<-solve(R,b)
phi.hat

c0=acf(diff(LakeHuron), type='covariance', plot=F)$acf[1]

# Calculate the variance of teh noise below. See estimation lectures
  in this lesson for help.
var.hat=c0*(1-sum(phi.hat*r))
var.hat
```

Run

Reset

- 0.1319
- 0.5220

Correct

Correct!

- 0.1594
- 0.7225

1 / 1 points

9.

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 $(0, 0.5220)$.

Correct

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

where Z_t~ Normal $(0, 0.7225)$

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

  where Z_t~ Normal $(0, 0.5220)$.

Correct

- [ ] $X_t = 0.1594X_{t-1} - 0.2081X_{t-2} + Z_t$

  where Z_t~ Normal $(0, 0.5220)$.

Un-selected is correct

- [x] $(1 - 0.1594B + 0.2081B^2)(1 - B)X_t = Z_t$

  where Z_t~ Normal $(0, 0.7225^2)$.

Correct

'LakeHuron' dataset

10/10 points (100.00%)

Quiz, 10 questions