PREDICTIVE ANALYTICS ISM-E1003

Homework 2, due date 19.03. at 10:00

What is the correct answer? Correct answer 4 points.

1. Consider the following model estimated for a time series

 *yt* = 0.3 + 0.5 *yt*-1 - 0.4 *εt-*1 + *εt*

where *εt* is a zero mean error process.

What is the (unconditional) mean of the series, *yt* ?

(a) 0.6

(b) 0.3

(c) 0.0

(d) 0.4.

2. Consider the following MA(3) process

 *yt* = 0.1 + 0.4*ut*-1 + 0.2*ut*-2 – 0.1*ut*-3 + *ut*

What is the optimal forecast for *yt*, 3 steps into the future (i.e., for time *t*+2 if all information until time *t*–1 is available), if you have the following data?

*ut*-1 = 0.3; *ut*-2 = –0.6; *ut*-3 = –0.3

1. 0.4
2. 0.0
3. 0.07
4. –0.1.

3. Which of the following sets of characteristics would usually best describe an autoregressive process of order 3 (i.e., an AR(3))?

(a) A slowly decaying acf, and a pacf with 3 significant spikes

(b) A slowly decaying pacf and an acf with 3 significant spikes

(c) A slowly decaying acf and pacf

(d) An acf and a pacf with 3 significant spikes.

4. A process, *xt*, which has a constant mean and variance, and zero autocovariance for all non-zero lags is best described as

(a) A white noise process

(b) A covariance stationary process

(c) An autocorrelated process

(d) A moving average process.

5. Which of the following conditions must hold for the autoregressive part of an ARMA model to be stationary?

(a) All roots of the characteristic equation must lie outside the unit circle

(b) All roots of the characteristic equation must lie inside the unit circle

(c) All roots must be smaller than unity

(d) At least one of the roots must be bigger than one in absolute value.

6. Which of the following statements are true concerning time-series forecasting?

(i) All time-series forecasting methods are essentially extrapolative

(ii) Forecasting models are prone to perform poorly following a structural break in a series

(iii) Forecasting accuracy often declines with prediction horizon

(iv) The mean squared errors of forecasts are usually very highly correlated with the profitability of employing those forecasts in a trading strategy.

(a) (i), (ii), (iii), and (iv)

(b) (i), (ii), and (iii) only

(c) (ii), (iii) only

(d) (ii) and (iv) only.

7. Consider a series that follows an MA(1) with zero mean and a moving average coefficient of 0.4. What is the value of the autocorrelation function at lag 1?

1. 0.4
2. 1
3. 0.34
4. It is not possible to determine the value of the autocovariances without knowing the disturbance variance.

8. Which of the following statements are TRUE?

1. An MA(q) can be expressed as an AR(infinity) if it is invertible
2. An AR(p) can be written as an MA(infinity) if it is stationary
3. The (unconditional) mean of an ARMA process will depend only on the intercept and on the AR coefficients and not on the MA coefficients
4. A random walk series will have zero pacf except at lag 1.
5. (ii) and (iv) only
6. (i) and (iii) only
7. (i), (ii), and (iii) only
8. (i), (ii), (iii), and (iv).

9. Consider the following picture and suggest the model from the following list that best characterises the process:



1. An AR(1)
2. An AR(2)
3. An ARMA(1,1)
4. An MA(3).

10. Consider the following AR(2) model. What is the optimal 2-step-ahead forecast for y if all information available is up to and including time *t*, if the values of *y* at time *t*, *t*-1 and *t*-2 are –0.3, 0.4 and –0.1, respectively, and the value of u at time *t*-1 is 0.3?

*yt* = –0.1 + 0.75*yt*-1 – 0.125*yt*-2 + *ut*

1. –0.1
2. 0.27
3. –0.34
4. 0.30.