Meeting - TSA Exam

Mittwoch, 4. Dezember 2019 15:01

P1

a) b) c) d)

1. Stationary mean constant — Strong trend not stat. — mean not constant not stat.

2. could take the Log, to make it look wiser — take diff(1) — modelling season. diff with ca. 200

Problem 2

ARMA $(P,Q)_S$

$$\Phi^P(B^S)\,x_t = \Theta^Q(B^S)\,w_t$$

$$(1-\phi_1 B^S - \phi_2 B^{2S} - \dots - \phi_P B^{PS})\,x_t = (1+\theta_1 B^S + \dots + \theta_Q B^{SQ})\,w_t$$

a) b) c) d)

$S=7$
$AR \Rightarrow P=1$

$S=12$
$ARMA(1,1)$

clear AR model
PACF cuts off
ACF tails off

Problem 3

Lab related exercise
the model

$$(1-\phi_1 B)(1-\phi_1 B-\phi_2 B^2)\,x_t = (1+\theta_1)\,w_t$$

1 diff (delta, difference = 2)

Problem 4

b) $(1-\phi_1 B)(1-B)\,x_t = (1+\theta_1 B)\,w_t$

$$(1-\phi_1 B)(1-B) = (1-\phi_1 B - B + \phi_1 B^2)$$

$$= 1-(\phi_1+1)B + \phi_1 B^2)\,x_t$$

$$= x_t - (\phi_1+1)\,x_{t-1} + \phi_1 x_{t-2}$$

2. acf, pacf
   ↳ season trend to see, acf goes up & down

3. look at parts of the ts

4. take diff again → isn't better → work with ddiff

5. diff season lag = 12

6. EACF on ddiff

7. model (2,0,1)
   model (0,0,2)
   model (2,0,2)

8. fit model ddiff
   ⇒ Acf shows seasonality of 12
   ↳ Ljung-Box is good in the first part

9. fit again with seasonal part
   ↳ look the residuals & compare
   acf - most of the lag values are significant
   print the fitted object (check estimate)

Expression
look at the

check redundancy polyroot()

forecast x_t
↳ if pred then on x_t then cumsum(cumsum())
or diff including in the model + original model

$$F = \begin{bmatrix} \phi_1 & \phi_2 \\ 1 & 0 \end{bmatrix}$$

$$\begin{bmatrix} \phi_{t+1} & -\phi \\ 1 & 0 \end{bmatrix}$$

c) $x_t = [1 \ \theta_1] \begin{bmatrix} z_t^1 \\ z_t^2 \end{bmatrix} = z_t^1 + \theta_1 z_t^2$

d) $y_t = 2 \cdot x_t + v_t$ where $v_t \sim N(\mu, R)$

$x_t = [1 \ \theta_1] z_t$

$y_t = 2x_t + v_t \rightsquigarrow y_t = 2[1 \ \theta_1] x_t + v_t$

$= [2 \ \ 2\theta_1] x_t + v_t$

f) FF = 2 * t(c(1, thetal))

F = matrix(c(phi1+1, 1, -phi1, 0), nrow=2)

Q = matrix(c(1,0,0,0), nrow=2)

Sigma0 = matrix(c(100, 0, 0, 100), nrow=2)

KSmooth() - function

h) $E(x_{t+1} | y_{1:6})$, $E(z_6^1 | y_{1:6})$, $E(z_6^2 | y_{1:6})$,
$E(z_6^2 - E(z_6^2 | y_{1:6}))^2 | y_{1:6})$
All of them are filters