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Time Series HW 4



1.1 Plot of X



1.2 Plot of Residuals of Fit1 of X



1.3 ACF and PACF of Fit 1 Residuals

1.a

> Fit1

Series: X

ARIMA(2,0,2) with non-zero mean

Coefficients:

ar1 ar2 ma1 ma2 intercept

1.5657 -0.8176 -1.3187 0.7160 130.0466

s.e. 0.1429 0.1054 0.1292 0.1155 0.1404

sigma^2 estimated as 0.8848: log likelihood=-152.43

AIC=316.87 AICc=317.67 BIC=333.18

With the model from auto.arima from the forecast library, it chose ARMA(2,2) as the appropriate model for these data. However, when checking for parameter significance, we can see that AR1 and MA1 are outside of 1, and AR2 contains 1; MA2 though seems to be alright for this model. The output from Randomness.tests though shows nothing significant, and thus ok.

Fit2 tries to fit best via MLE, and while the parameters for Fit2 are usable and good, Randomness.test reveals that it fails 3 of the procedures. This makes this model also unfit for these data.

1.b

Out of these two, ARMA(2,0,2) seems to be the best choice with only truly failing AR2. Thus we can proceed with the data analysis. Looking at plots 1.1, 1.2, 1.3 we can see that this model appears to be ok.

1.c

c( mean(MLE[,1]), sd(MLE[,1]), sqrt(mean(Vars[,1])) )

[1] 1.5657408 0.0000000 0.1429453

> c( mean(MLE[,2]), sd(MLE[,2]), sqrt(mean(Vars[,2])) )

[1] -0.8176223 0.0000000 0.1054069

> c( mean(MLE[,3]), sd(MLE[,3]), sqrt(mean(Vars[,3])) )

[1] -1.3186866 0.0000000 0.1291643

> c( mean(MLE[,4]), sd(MLE[,4]), sqrt(mean(Vars[,4])) )

[1] 0.7160445 0.0000000 0.1154892

Based on the output from the simulation, the asymptotic SE and the SE from Fit1 are about the same. This would lend to the idea that this model is the best fit for this data.

1.d

I still get the same results from the significance tests from before, since the asymptotic SEs are the same.

1.e



1.4 Predict 10 steps ahead for X data

Script for HW 4:

X1 <- read.csv("http://gozips.uakron.edu/~nmimoto/689/TS-hw4\_data01.csv")

X <- ts(X1[,2], start=796) #- extract only second column as time series

plot(X,type="o")