Homework 7

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1. Is the time-series stationary? How do you know? (2 marks)

The time-series is not stationary as there is an upward trend. Also the Q-Q plot indicates its not normal. This ends up being resolved by differencing the data.

2. Assess the ACF and PACF plots of the time series data. What do these plots tell you about the order of the model? (2 marks)

AR order 1 model as the ACF shows geometric decay and the PACF is significant until p lags.

3. Fit the data using several different ARMA models. Interpret the ACF and PACF plots for the residuals. Based on the ACF and PACF plots what ARMA model(s) are appropriate for the dataset? (3 marks)

It appears that the best model for the data is AR of 2 and MA of 0 with a ‘I’ of 1 with an AIC of 2842.73. This model had very few values outside the acceptable area in its ACF and PACF plots of the residuals, and also had the best AIC value. AR of 1 and MA of 1 with an ‘I’ of 1 was also very good with acceptable ACF and PACF plots of residuals, but had a slightly higher AIC at 2843.62. More complex models such as (2,1,2) had good ACF and PACF plots of the residuals but had high AIC scores due to their complexity.

4. Based on AIC, what model is most appropriate for the TS dataset? (1 mark)

The best model found was with an AR of two, an ‘I’ of 1, and an MA of zero.

5. What are the values of the AR and MA parameters? What do they mean? (4 marks)

The value of the AR (autoregression) parameter is 2 meaning it looks back at the value from one and two time steps ago to help predict the current value.

The value of the MA parameter is 0 meaning that the moving average component is not being used. If it was this would look at previous errors to predict the current value.