

Homework 1

M7: Predictive Analytics

Due: December 25, 2020 (23:59)

This assignment is to be carried out individually. You can discuss your solutions with your friends, but please write your solutions individually. Submit your solution, including all the code scripts, as a single PDF or JPYNB file via LMS. (This exercises are from the textbook. All data are posted at LMS.)

Late Homework Policy: *If you submit your homework late up to 7 days, there will be a 20% penalty. Any homework will not be accepted after 7 days.*

1. For the dole dataset, make a graph of the data. The dataset represents monthly total of people on unemployment benefits in Australia (Jan 1956 – Jul 1992). If transforming seems appropriate, do so and describe the effect.
2. Calculate the residuals from a seasonal naïve forecast applied to the quarterly Australian beer production data from 1992. The dataset includes total quarterly beer production in Australia (in megalitres) from 1956:Q1 to 2010:Q2. Test if the residuals are white noise and normally distributed. What is the accuracy of the seasonal naïve method? What do you conclude?
3. The plastics data set consists of the monthly sales (in thousands) of product A for a plastics manufacturer for five years.
 - a. Plot the time series of sales of product A. Can you identify seasonal fluctuations and/or a trend-cycle?
 - b. Use a classical multiplicative decomposition to calculate the trend-cycle and seasonal indices.
 - c. Do the results support the graphical interpretation from part a?
 - d. Compute and plot the seasonally adjusted data.
 - e. Change one observation to be an outlier (e.g., add 500 to one observation), and recompute the seasonally adjusted data. What is the effect of the outlier?
 - f. Does it make any difference if the outlier is near the end rather than in the middle of the time series?
4. Download ING_Stock time series data. These represent closing prices of ING Stock traded at NYSE data during 2019.
 - a. Generate 90% prediction interval for the next 14 days with the one-step ahead naïve forecast method using bootstrapping.

- b. Generate 90% prediction interval for the even days of the next 14 days with the two-step ahead naïve forecast method using bootstrapping.
- c. Compare the results. Which model gives better prediction intervals for day 14 forecasts?