University of San Diego
SHILEY-MARCOS SCHOOL OF ENGINEERING

ADS 506 Module 6 Exercises: Chapter 9

This assignment is due on Day 7 of the learning week. The assignment for this module is a mixture of programming and written work. Complete this entire assignment in R Markdown. You will need to include the question and number that you are answering within your submitted assignment. **Once completed, you will knit your deliverable to a Word/PDF file.**

Chapter 9: Neural Networks (Page 201): #2 & 3

Forecasting Australian Wine Sales: Figure 6.26 shows time plots of monthly sales of six types of Australian wines (red, rose, sweet white, dry white, sparkling, and fortified) for 1980-1994. Data available in AustralianWines.csv. The units are thousands of liters. You are hired to obtain short-term forecasts (2-3 months ahead) for each of the six series, and this task will be repeated every month.

2. Use neural networks to forecast fortified wine sales, as follows:

- Partition the data using the period until December 1993 as the training period.
- Run a neural network using R's `nnetar` with 11 non-seasonal lags (i.e., $p = 11$). Leave all other arguments at their default.

    a. Create a time plot for the actual and forecasted series over the training period. Create also a time plot of the forecast errors for the training period. Interpret what you see in the plots.
    b. Use the neural network to forecast sales for each month in the validation period (January 1994 to December 1994).

3. Compare your neural network to an exponential smoothing model used to forecast fortified wine sales.

a. Use R's `ets` function to automatically select and fit an exponential smoothing model to the training period until December 1993. Which model did `ets` fit?
b. Use this exponential smoothing model to forecast sales for each month in 1994.
c. How does the neural network compare to the exponential smoothing model in terms of predictive performance in the training period? In the validation period?