15.2 Exercises

Basic Concepts

1. What is a simple moving average?
2. What would we do if we wanted to predict or forecast for several periods in the future?
3. Give an advantage and a disadvantage of using a simple moving average.
4. How can you determine the number of periods and the appropriate weights for each of those periods in a weighted moving average?
5. What is the primary disadvantage of moving average methods?
6. As the number of periods increases in the moving average, what happens to the forecasts?

Exercises

Data

The data set can be found by visiting stat.hawkeslearning.com and navigating to **Discovering Business Statistics, Second Edition > Data Sets > Border Crossings**.

7. Use the Border Crossings data set. Provide a 3-month SMA forecast for the Laredo truck crossings and predict the number of truck crossings for January 2019.
8. Use the Border Crossings data set. Provide a 5-month SMA forecast for the Laredo passenger crossings and predict the number of passenger crossings for January 2019.
9. Use the Border Crossings data set. Provide a 5-month SMA forecast for the Detroit truck and passenger crossings and predict the number of truck and passenger crossings for January 2019.
10. Use the Border Crossings data set. Provide a 3-month WMA and 5-month WMA forecast for the Laredo truck crossings and predict the number of truck crossings for January 2019. Note: Use the weights of 0.6, 0.3 and 0.1 for the 3-month WMA and 0.4, 0.3, 0.15, 0.1 and 0.05 for the 5-month WMA.

Data

The data set can be found by visiting stat.hawkeslearning.com and navigating to **Discovering Business Statistics, Second Edition > Data Sets > Mortgage Rates**.

11. Use the Mortgage Rates data set, which includes the yearly mortgage rate in the U.S. from 1971. Predict the U.S. mortgage rate for the year 2020 using a 4-year SMA and 4-year WMA. For WMA use the weights of 0.4, 0.3, 0.2 and 0.1, respectively.

Data

The data set can be found by visiting stat.hawkeslearning.com and navigating to **Discovering Business Statistics, Second Edition > Data Sets > Monthly Average Retail Gas Prices**.

12. Use the Monthly Average Retail Gas Prices data set, which includes the average gas prices in the U.S. from April 1993 to July 2021. Predict the retail gasoline price for August 2021 using a 5-month SMA, compare it with a 3-month SMA.

15.3 Exponential Smoothing Techniques

Simple Exponential Smoothing

Another technique that we will use is called **Simple Exponential Smoothing**. With simple exponential smoothing, we weight the most recent observation more than the past using a convex combination of weights. This weighting scheme allows the forecast to react more strongly to quick changes in the data based on the smoothing constant α, which is used as the weight. Small values of α do not react well to changes in the data, whereas large values of α react quickly to changes in the data.

Definition

Simple Exponential Smoothing

In **simple exponential smoothing**, we weight the most recent observation more than the past using a convex combination of weights.