A7: Functions, Loops, and If...Else

Create code to achieve the described tasks and answer the question posed. Submit your code and results as an HTML webpage rendered from an R Markdown or Quarto file. Make sure to specify the questions/tasks, associated answers, and show/demonstrate the code.

Overall Accuracy Function

Create a function that will calculate overall accuracy for a classification when given the correct class and the predicted class. A data set is provided (**classification_data.csv**), which contains three columns: "class", "spec", and "spec_lidar". The "class" column contains the correct classification (what the sample actually was) whereas the "spec" and "spec_lidar" columns contain the predicted classification (what an algorithm predicted the class to be). Specifically, the "spec" column is a result obtained using just spectral image bands while the "spec_lidar" column is a result obtained using a combination of spectral bands and light detection and ranging (LiDAR) data.

Create a function that will generate a contingency table, or confusion matrix, from the correct and predicted data, calculate overall accuracy from the table, then return the overall accuracy result. Note that the table() function can be used to create a contingency table or confusion matrix. The diag() function can be used to extract values in the diagonal cells that represent the correct predictions. You will also need to use sum(). (12 Points)

Use your new function to calculate the overall accuracy for the spectral only and spectral + LiDAR results. (4 Points)

Q1: Which model yielded the best classification performance? (4 Points)

For Loops

Create a for loop that will test whether a value is even or odd then print TRUE or FALSE for each value in a vector. Create a short vector of integer values and test the for loop on these data. (6 Points)

Create a for loop that will convert text to all upper case and write the results to an empty vector object. So, the result should be a vector of the same length as the original but with the text in all upper case. Test the for loop using a short vector of text data. (6 Points)

If...Else

Combine a for loop and if...else statement to write all rows or samples in the **classification_data.csv** that were correctly predicted using the spectral and LiDAR ("spec_lidar") data to a new data frame and all incorrectly classified rows to a different data frame. (8 Points)