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DCS 211
Lab 5
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3. Accuracy: 0.986

4. The accuracy of the 20% train and 80% test model run was 0.960 compared to 0.994 for the same permutation. So, the accuracy was slightly worse but also a great accuracy overall.

5. Based on the heatmaps of the first five misidentified digits, it makes sense that they were misclassified. Some of the digits look like they could be: 3 or 9, 6 or 8, 7 or 2, and one was just illegible (looked like a backwards "c" rather than a number). So, given the fact that I had to really think about what the digits were in the heatmaps, it makes sense that the model got the predictions wrong.

6.
    a. How the data was collected: because this data was collected through handwritten digits, it makes sense that the subjective aspect of people's handwriting would make some data entries unclear. For example, some people may write 7's with a line through them, while others may not. Interpreting all of these handwritten values into specific digits can run into the issue of misinterpretation of handwriting.
    b. From whom the data was collected: because the data was collected from different people, stylistic differences in the numbers as well as general differences in people's handwriting and legibility make it difficult to identify every data entry completely right.
    c. What the data itself represents: because the data itself represents the intensity of the writing to give the shape of the digit, a misinterpreted digit and intensity calculations would cause misleading data. Because the data aims to describe the digit with the intensity values, if intensity values are correct, this doesn't necessarily mean that the digit is interpreted correctly.

7. I chose the value of 60 for k because, given the amount of observations we're dealing with in this dataset, it seemed like a reasonable number of observations to draw on when trying to decide the closest value. In other words, it seems not too specific, but also not too lenient, so hopefully it's an okay middle ground. This k resulted in 329 correct predictions out of 353 total predictions made. In others words, this k resulted in a 93.201% success rate.

9.
    a. Is k the same for all?

        i.   No k is not the same for all models tested. Multiple k values are evaluated to observe how prediction accuracy changed. Each experiment used a different k, and the results were compared to determine which k performed best.

   b. What k did you choose as the best value, and why?

        i.   The best k chosen was k=14, achieving the highest accuracy at 0.969

10.

Reported Accuracy

Model trained and tested with k = 14

Prediction accuracy: 0.9688