

### Programming Assignment 03: Nearest Neighbor Classifier

In this assignment we implemented two algorithms for predicting the classification for an object: The Nearest Neighbor (NN) Classifier and the K-Nearest Neighbor (KNN) Classifier.

Both of these algorithms identify the classification of a datapoint based on the classification of the other data points that it is closest to. The NN classifier will form predictions based off a single point that it is closest to. The KNN classifier will form predictions based on the nearest K-number of datapoints closest to the one we are trying to predict. Each of the datapoints gets a vote, and the class with the most votes is the class that the datapoint we are analyzing is predicted to have.

To create a Nearest Neighbor Classifier, we can basically write the code for the K-Nearest Classifier and just make a K-value equal to 1 to represent only one neighbor. Another thing to make sure of when setting a K value is to always use an odd number to prevent a possible tie from occurring when an equal amount of neighbors are divided between a classification.

The results are shown below:

1. K=1 (Nearest Neighbor) Accuracy: 98.4%
2. K=3 Accuracy: 99%
3. K=5 Accuracy: 99.2%
4. K=7 Accuracy: 99.2%

As you can see in the result above, the NN classifier is not as accurate as the KNN classifier since it is using less neighbors to cast a vote. However, it seems there is a point of diminishing returns as you increase the number of neighbors casting a vote. This occurred around K=5.