

Full name: Thi Ngoc Anh, Tran
Student ID: 9102520232

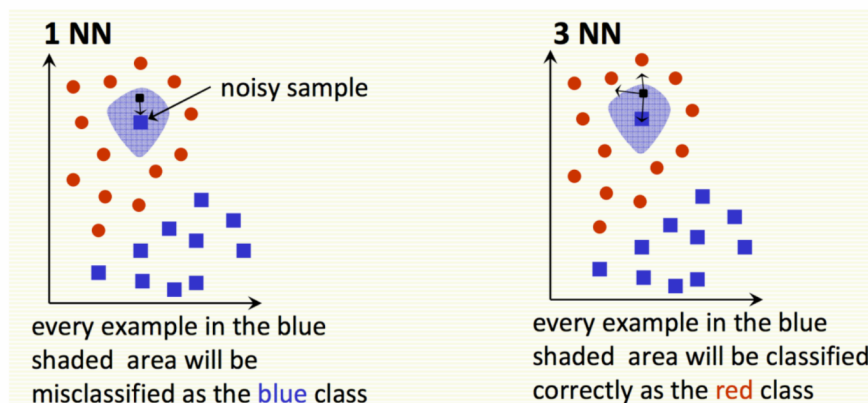
Assignment 1 Report

a) Make a k-NN (starting with k=5) and its training/validation/evaluation code to perform multiclass classification over all digits.

- Please go to this [Link](#)

b) What are the hyperparameters you can tune?

- The number of neighbors (k) is considered when voting to make a prediction. I tested the k value from 5 to 20 in my code.



- The type of distance metric (p) is used to compute the distances between two data points. In my assignment, I used 2 common types of distance metrics. There are Manhattan distance ($p = 1$), and Euclidean distance ($p = 2$).

c, Report the performance for each option.

- | | |
|--|--|
| - With the Euclidean distance ($p = 2$), | - With the Manhattan distance ($p = 1$), |
| p: 2 k: 5 val_acc: 0.9727 | p: 1 k: 5 val_acc: 0.9647 |
| p: 2 k: 6 val_acc: 0.9727 | p: 1 k: 6 val_acc: 0.9643 |
| p: 2 k: 7 val_acc: 0.9723 | p: 1 k: 7 val_acc: 0.9660 |
| p: 2 k: 8 val_acc: 0.9720 | p: 1 k: 8 val_acc: 0.9642 |
| p: 2 k: 9 val_acc: 0.9712 | p: 1 k: 9 val_acc: 0.9637 |
| p: 2 k: 10 val_acc: 0.9700 | p: 1 k: 10 val_acc: 0.9625 |
| p: 2 k: 11 val_acc: 0.9702 | p: 1 k: 11 val_acc: 0.9630 |
| p: 2 k: 12 val_acc: 0.9690 | p: 1 k: 12 val_acc: 0.9612 |
| p: 2 k: 13 val_acc: 0.9687 | p: 1 k: 13 val_acc: 0.9617 |
| p: 2 k: 14 val_acc: 0.9685 | p: 1 k: 14 val_acc: 0.9605 |
| p: 2 k: 15 val_acc: 0.9683 | p: 1 k: 15 val_acc: 0.9612 |
| p: 2 k: 16 val_acc: 0.9687 | p: 1 k: 16 val_acc: 0.9613 |
| p: 2 k: 17 val_acc: 0.9673 | p: 1 k: 17 val_acc: 0.9607 |
| p: 2 k: 18 val_acc: 0.9663 | p: 1 k: 18 val_acc: 0.9602 |
| p: 2 k: 19 val_acc: 0.9658 | p: 1 k: 19 val_acc: 0.9585 |

d, What is the final test accuracy?

- The test accuracy is 0.9666 with the $k = 5$.