**ELEC 6910T – Deep Learning Assignment 1**

1. The KNN classification algorithm assumes that similar things exist in a close proximity and hence, no training is required. Therefore, during the test case, it assumes that the test data of the image is similar or matched with the nearest training data of the image. The main issue with this algorithm is that it is very slow due to the long computation time. When using the 1-nearest neighbor, the accuracy is 96.31% and the maximum accuracy is obtained at K=3 neighbors with the accuracy of 96.33%.

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| **K** | **Test Accuracy** |
| 1 | 96.31% |
| 2 | 95.40% |
| 3 | 96.33% |
| 4 | 96.07% |
| 5 | 96.18% |
| 6 | 96.10% |
| 7 | 96.15% |
| 8 | 95.95% |
| 9 | 95.97% |
| 10 | 95.89% |

1. When the value of the hidden neurons is increased, the test accuracy increases. This is because MLP is a feedforward artificial neural network that is used as a universal approximator. It utilizes supervised learning and backpropagation for training. Based from the results, the maximum test accuracy is obtained when the number of neurons is 256.

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| **Number of Neurons** | **Test Accuracy** |
| 4 | 38.55% |
| 8 | 87.37% |
| 16 | 93.50% |
| 32 | 95.31% |
| 64 | 96.42% |
| 128 | 97.08% |
| 256 | 97.55% |

1. Using the LeNet CNN, the test accuracy is 98.09% which is higher than the MLP of 256 neurons (97.55%). Therefore, LeNet CNN architecture is better than MLP for image classification.
2. CAN with 32 feature channels has the highest test accuracy compared to all the other network with the test accuracy of 99.24%. When the feature channels were decreased from 32 to 16, the test accuracy decreased slightly to 99.21%. Therefore, CAN has the highest accuracy but the computation time is slow. Due to the slow computation time, I used 10 epochs as the program crashed upon using 20 epochs.