

Coding Test

March, 2020

1

Codes can be submitted in PyTorch / TensorFlow. Please write appropriate comments as required. You may use CIFAR-10 dataset [[download link](#)].

Question - 1

Implement k-Nearest Neighbor (k-NN) algorithm (without libraries) to perform classification on a dataset of images from 10-classes.

- 1.1. Write a function to choose the appropriate value of k based on the maximum classification accuracy on the validation set data.
- 1.2. Modify the code to use the cosine similarity of data-pairs instead of standard Euclidean distance in k-NN algorithm.

Question - 2

Let's take a pre-trained AlexNet architecture as the backbone network for the classification task on the same 10-class image dataset.

- 2.1. Write a code to fine-tune only the final layer of this pre-trained architecture on the current dataset. Rest of the network layers should remain unchanged.
- 2.2. Modify the code to incorporate a dynamic learning rate for fine-tuning. You can condition it on the rate of change of the loss function or simply on number of epochs.
- 2.3. Make the required changes in the code to implement the following,
 1. Remove the last convolution layer of the network
 2. center loss [[ref. paper link](#)]