Assignment III

[15 Marks]

Q1)
Perform the following on MNIST dataset to build three new datasets:

1. Obtain foreground segmentation masks for images in MNIST dataset using TSS-based threshold [Q1, Assignment 1]. In this way, you have rough groundtruth masks required to build a new foreground segmentation dataset. [1 Mark]
   Note: The pre-existing labels are of no use here. The goal of the dataset is just to extract the foreground.

2. Obtain tight groundtruth circles around the foreground segmentation masks obtained in (a). In this way, you can build a new dataset of 10 classes for performing classification with circlization (circular localization). You can use existing libraries for generating the tight circles. [1 Mark]

3. Randomly concatenate 4 images and their corresponding groundtruths obtained in (a), along with the pre-existing labels, in a 2x2 manner to develop new images and semantic segmentation groundtruths, respectively. In this way, you have a new dataset of 10 classes for performing semantic segmentation. [2 Marks]

Q2)
Train a DL network from scratch for performing **foreground extraction** on the new dataset obtained in Q1 (a). Report your test performance using Jaccard similarity. [3 Marks]

Q3)
Train a DL network from scratch for performing **classification with circlization** on the new dataset obtained in Q1 (b). Report your test performance using Jaccard Similarity. [4 Marks]

Note: If the classification is already wrong, the Jaccard Similarity score will become zero.

Q4)
Train a DL network from scratch for performing **semantic segmentation** on the new dataset obtained in Q1 (c). Report your test performance using Jaccard Similarity. [4 Marks]