Assignment II (EE 655: CV & DL)

[Total: 10 marks]

Q1) Perform the following tasks on the MNIST dataset to build three new datasets: **[2 Marks]**

a) Obtain foreground segmentation masks for the images in the MNIST dataset using the Otsu thresholding method. This will provide rough ground truth masks required to build a new foreground segmentation dataset.

b) Obtain tight ground truth circles around the foreground segmentation masks obtained in (a). This will create a new dataset of 10 classes for performing classification with circlization (circular localization). You may use existing libraries to generate the tight circles.

c) Spatially concatenate randomly chosen 4 images and their corresponding ground truths obtained in (a) in a 2x2 manner to develop new images and semantic segmentation ground truths, respectively. This will result in a new dataset of 10 classes for performing semantic segmentation.

Q2) Train a DL network from scratch to perform foreground extraction on the new dataset obtained in Q1(a). Report your test performance using the IoU metric. **[2 Marks]**

Q3) Train a DL network from scratch to perform classification with circlization on the new dataset obtained in Q1(b). Report your test performance using the IoU metric. **[2 Marks]**
Note: If the classification is wrong, consider the IoU metric score as zero.

Q4) Train a DL network from scratch to perform semantic segmentation on the new dataset obtained in Q1(c). Report your test performance using the Dice Coefficient. **[2 Marks]**

Q5) Apply one of the background subtraction algorithms to the given video and use appropriate post-processing techniques to generate a new video with the provided image as the background. The entire process should be implemented using a program. **[2 Marks]**