

# EAS 595 Assignment-1

02/14/2022

Deadline: 02/28/2022

Total: 50 Marks

You are free to use any computing resources available at your disposal. Please check out free resources such as Google Collab. The assignment is expected to be submitted in Python. You are free to use any ML/DL framework or library as part of the assignment.

1. **(25 pts)** Generate or develop a perceptron algorithm using the first two classes of the MNIST dataset based on the following architectures:

- 1a. When you have two neurons at the output layer
- 1b. When you have single neuron at the output layer

As part of the code, perform detailed analysis with respect to the accuracy and loss. Which type of the network performs best and why?

Report the confusion matrix and its ingredient metrics such as TP, FP.

2. **(15 pts)** Develop a perceptron algorithm for each of the following logic gate: AND, OR, and XOR

3. **(2 pts)** What is the difference between a validation set and a test set? Discuss in brief.

4. **(3 pts)** Why should we not prefer the accuracy metric if the dataset is not balanced? Which set (train, validation, or test) of the database should be balanced to use the accuracy metric?

5. **(5 pts)** Using the images of the MIST dataset, apply the different data augmentation techniques using your python programming and showcase the generated samples.