**CSC 417/617/717 Deep Learning in Computer Vision (Fall 2024)**

**Assignment #3, Generative Networks**

**Due: 2 pm, Oct. 17th**

**Problem I: Assigned to ALL students.**

**Problem II: Assigned to graduate students (optional to undergraduate students). Undergraduate students will receive a bonus point.**

### Problem I. Deep Convolutional GAN (DCGAN)

This assignment is designed for you to get familiar with Deep Convolutional GAN. Modify the given code based on Steps 1-2 below.

**Code**: HW3-1_DCGAN.ipynb (Files >> 2_Code in Canvas)

**Step 1.** Use FashionMNIST dataset.

References: https://keras.io/api/datasets/

**Step 2.** Modify the *Generator* network to be

**(input size = 100)**

**FC: 7x7x256, BatchNorm, LeakyReLU**

**CONV: 128 5x5 filters (stride 1, padding 1), BatchNorm, LeakyReLU**

**CONV: 64 5x5 filters (stride 2, padding 1), BatchNorm, LeakyReLU**

**CONV: 64 5x5 filters (stride 1, padding 1), BatchNorm, LeakyReLU**

**CONV: 1 5x5 filters (stride 2, padding 1), tanh**

**Note**: In the Generator, CONV denotes Transposed Convolutional Layers. In DCGAN, strides are used with convolutional layers rather than using pooling/unpooling payers.

### Problem II. Convolutional Autoencoder

This assignment is to understand latent representation by Autoencoder. Modify the given code based on Steps 1-2 below.

**Code:** HW3-2_autoencoder.ipynb (Files >> 2_Code in Canvas)

**Step 1.** For both the encoder and decoder, use a 5x5 filter for the only convolutional layers to produce 14x14 feature maps.

**Step 2.** The decoder aims to restore the given input image to the encoder. For that, which should be entered in 'AAA' in the final code line (copied below) of the decoder? Replace it with a number and run the code thoroughly.

```
layers.Conv2D(AAA, kernel_size=(3, 3), activation='sigmoid',
padding='same')])
```

**Submission:** Submit a single Jupyter Notebook file or Zip file (if you have two Notebook files) via CANVAS. Use *Yourname_HW3.ipynb or .zip* as your submission filename.

**NOTE:** Make sure that you submit your code with all results displayed (otherwise, 25% of your points will be deducted).