1. **20 Points**

   Load the CelebFaces Attributes (CelebA) dataset created by the Chinese University of Hong Kong (http://mmlab.ie.cuhk.edu.hk/projects/CelebA.html).

   a. Generate the "average" face using 1000 images in the dataset.

   b. Generate the average male image within this dataset.

   c. Generate the average female image within this dataset.

   d. Generate an image with random sampling.

   e. Why is the average image appear smooth while the image generated using random sampling grainy?

2. **40 Points**

   Using the MNIST dataset build a PixelCNN using a masked convolution with a 7x7 mask. Use ReLU and Sigmoid activation functions.

   a. Build a network with 7 residual blocks where the there is no downsampling of the feature map and so padding is set to "same".

   b. Display the summary of the model.

   c. Compile the PixelCNN and run 10 epochs. Display the output of 25 images.

   d. Run for 25 epochs and display the output.

   e. Comment on the results of the PixelCNN along with computation speed.

3. **40 Points**

   Using the MNIST dataset build a DCGAN using a 7x7 mask. Use LeakyReLU as your activation function and with the padding set to "same". Use the Adam optimizer for both the generator and discriminator. (Code can be found at: https://www.tensorflow.org/tutorials/g

   a. Generate a noise image with a normal distribution with pixel intensity values from 0 to 100 and display the image.

   b. Compile the model and run for 10 and 25 epochs and display the output.

   c. Comment on the computation speed and quality of images generated compared to PixelCNN.