DL (2023)
DL course Assignment 5: GAN [100 Marks]
Deadline: 05/05/2023, 23:59:59

Programming instructions:

1. Programming language: Python
2. Use of PyTorch is compulsory.

Reporting instructions:

1. Please submit all your working codes as .py or .ipynb files.
2. A single report (PDF) file should be submitted containing all relevant information including data pre-processing, observations, results, and analysis across the problem. Do not put snapshots of code in the report.
3. The report should be detailed and clearly explain every step you have followed. All the intermediate outputs, their inferences should be present in the report. The PDF file should be properly named with your complete roll number XYZ (ex:“XYZ_DLOps_Assignment-1.pdf”), with your name and roll number mentioned inside the report as well.
4. Mention any resources/articles/GitHub links that you may have used as a reference to solve any question of the assignment in the references section of the report.
5. Make sure all the submission files along with the working codes are included in a single zip file.

General instructions:

1. DO NOT plagiarize from the internet or your peers. The institute’s plagiarism policy will be strictly enforced.
2. The assignment will be evaluated out of 50% of the total marks in case a report is not submitted.
3. We highly suggest using Google Colab with GPU runtimes for this assignment.

Q1 Train a DCGAN to generate images from noise. Use the EMNIST(Extended MNIST) database to learn the GAN
Network.

[**Discriminator in DCGAN**:-
i. if roll no. % 2 == 0: use VGG11 as a discriminator.
ii. if roll no. % 2 == 1: use Resnet 56 as a discriminator.]

Perform the following tasks: [20 marks for training GAN]
a. Uniformly generate ten noise vectors that act as latent representation vectors, and generate the images for these noise vectors, and visualize them at [5 + 5 + 5 marks]

i. After the first epoch.

ii. After n/2 th epoch.
iii. After your last epoch. (say n epochs in total)
and comment on the image interpretation at (i), (ii) and (iii) and can you identify the images? [5 marks]

b. Plot generator and discriminator losses for all the iterations. Also display the best-generated images by the model.[One iteration = forward pass of a mini-batch] [10 marks]

Q2. Download the pre-trained StyleGan(v1, v2 or v3).

1. Generate 10 realistic images using the StyleGAN.[10 marks]
2. Take your face image and 5 different face images of your friends (One image per friend). Perform feature disentanglement and linear interpolation between your face and your friend's face. [40 marks]

An example is shown below: