

DL/DLOps (2023)
DLOps Lab Assignment : GAN and Hyper Parameter Tuning [100 Marks]
Deadline: 24/04/2023, 23:59:59

Programming instructions:

1. Programming language: Python
2. Use of PyTorch is compulsory. Marks shall not be given for TensorFlow implementation.

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. Record a video of your terminal/ipynb file which shows that your written codes are working. (max. video size - 3 minutes)
5. 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.
6. 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.
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Question 1 [50 marks]

Train a Conditional Deep Convolutional Generative Adversarial Network (cDCGAN) on [Dataset](#). (You may use this for [Reference](#)) [25 Marks]

- A. Generate 50 Samples of each class from your trained generator. [5 Marks]
- B. Train a **ResNet18** classifier on the given dataset and treat the generated samples as test dataset and report following [20 Marks]
 1. F1 Score for each class
 2. Confusion matrix

Reference: <https://learnopencv.com/conditional-gan-cgan-in-pytorch-and-tensorflow/>

Questions 2 [50 marks]

Train a CNN based classification model and perform Optimized Hyperparameter Tuning using Optuna Library on the below-mentioned dataset. Perform 100 trials.

Hyperparameters should be

- 1) No of Convolution Layers 3 to 6
- 2) Number of Epochs 10 to 50
- 3) Learning rate 0.0001 to 0.1

Report the observations and the best trial. Report how many trials were pruned

For Even Roll Number MNIST

For Odd Roll Number Fashion MNIST

Reference: <https://github.com/elena-ecn/optuna-optimization-for-PyTorch-CNN>