ADRL 2023 - Assignment 3

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1. **Problem 1:** Construct a DDPM on the animal face data. Experiment with three different values of backward inference time - Plot a grid of 10 by 10 images for all three cases and compute the FID. Take the VAE implemented in Assignment 1 and use it to implement a class-conditional DDPM on its latent space. Use classifier guidance with the score-based formulation.

2. **Problem 2:** Implement Self-supervised learning using Momentum Contrast Encoder method (MoCO). Try 3 sets of augmentation methods. Implement a linear classifier on the learnt representations. Compare it with a full-blown CNN, that has the same number of parameters. Record the reduction in the amount of supervised data needed.

General Instructions:

1. We use only one dataset for this assignment.

2. The animal face dataset can be found here - data

3. The dataset consists of 16,130 images of 3 animal faces at $512{\times}512$ resolution.

4. You need to downsize all images to 128x128 pixels before implementing.

5. Use Google collab with Jupiter notebook for all the computing.

6. You are supposed to submit a single Jupiter notebook with all the solutions made into separate blocks.

7. Use Pytorch for building neural networks. You are supposed to directly use the off-the-shelf functions for the models asked.

8. A report has to be submitted that would list all the experiments, results, and observations. This should be embedded in the Jupiter notebook itself.

9. Use matplotlib for plotting.

10. The final evaluation **does not** depend on the accuracy metrics but is based on the **quality of your experiments and observations thereof**.

11. We will run a plagiarism check on the codes. Any suspicion of copying would lead to a harsh penalty from negative marks in the assignment to a failing grade in the course, depending upon the severity. Therefore, kindly refrain from copying others' codes and/or reports.