Third Assignment
Classify Real vs AI-Generated Faces with Deep Learning
Deadline June 9, 25

In this assignment, you will develop a binary image classification model to distinguish between: Real faces and AI-generated faces.

Dataset Construction
You need to build your own dataset from resources available from the Internet. You will use multiple datasets and decide how to best organize your data. You will need to resize the images (choose the size you feel it is the best considering the available data and the computational resources you have!). You can use any number of images to train and test the model.

For the Real Faces:

1. **FFHQ (Flickr-Faces-HQ).** It contains ~70,000 high-quality images (1024×1024) of real human faces and includes diverse age, ethnicity, lighting, and background.
   Official GitHub: https://github.com/NVlabs/ffhq-dataset
   Preprocessed on Kaggle (512x512) (21 GB):
   https://www.kaggle.com/datasets/arnaud58/flickrfaceshq-dataset-ffhq

2. **LFW (Labeled Faces in the Wild)**, this is the dataset you used in the second assignment.

For the AI-Generated Faces

1. **This Person Does Not Exist (TPDNE).** It includes more than 10,000 synthetic face images created using StyleGAN2.
   Download from Kaggle:
   https://www.kaggle.com/datasets/almightyj/person-face-dataset-thispersondoesnotexist

2. **All These People Don't Exist.** It includes more StyleGAN2-generated synthetic faces with various quality levels. (*I didn't check if the 2 datasets overlap!!)*
   Download from Kaggle:
   https://www.kaggle.com/datasets/bwandowando/all-these-people-dont-exist

3. **AI-Generated Faces – Kaggle:** A collection of AI-generated human faces.
   Download: https://www.kaggle.com/datasets/chelove4draste/ai-generated-faces

Dataset Organization and Experimental Protocol
Choose your own strategies to balance the dataset/augment the data, pre-process the data
For the experiments, use the following splits: 70% training, 15% validation, 15% test.
Split the data so to maintain the test set balanced!

Architecture:
Your model should nicely combine convolutional layers and attention mechanism in the way you feel is optimal to solve the problem.
The experiments (validation results) should help determine whether the attention mechanism improves the model's ability to correctly classify the images *[in practice try your model with and without attention!]*. I suggest keeping an eye on the model complexity (always prefer the simplest solution!!!).

Training:
Monitor validation loss to stop training early when performance plateaus.

To account for unbalanced dataset, ensure both classes are evenly represented or apply class weighting. Consider applying, if you want, a focal loss.

Evaluation:
You should demonstrate the performance of you model by assessing the following metrics:
Accuracy, Precision, Recall, F1-Score, Confusion Matrix.