COMSYS Hackathon-5

Theme : Robust Face Recognition and Gender Classification under Adverse Visual Conditions

TASK_A : Gender Classification

For the first task work is to identify the gender whether it's a male / female. Dataset given with male and female including train and validation data sets.

I have basically used colab for Task A due to its inbuild T4 GPU (Limited Access). At first mount with drive then import all the necessary libraries. Used EfficientNetB0 as it's a powerfull with lightweight CNN pretrained model, resize all the photos as (224, 224) best for EfficientNetB0 and trained for 30 times. Used important paths and also called them from drive, done a class weights for marking as male, female and make the female as 0 to prevent bias. Then run that code and also check with some images that it giving correct result that it's a male or female. The model weights are basically saved as .h5 file and used the drive path to store them in the drive.

The whole work done in Tensorflow Keras this is a better for model training for this one is a perfect for both beginners and professionals. In this project model build with EfiicientNetB0 using ModelCheckpoint, EarlyStopping and Image DataGenerator as they are very effective using Keras. Tensorflow gives best deep learning, data augmentation, loading & saving model and efficient architectures.

The Evaluation Metrices are **VALIDATION SET :-** ACCURACY – 0.8626, PRECISION – 0.9246, RECALL – 0.8896, F1–SCORE – 0.9068 and **TRAIN SET :-** ACCURACY – 0.8768, PRECISION – 0.9478, RECALL – 0.8950, F1–SCORE – 0.9206.

TASK_B : Face Recognition

In this task the main work is for matching face in different conditions with the original image.

I have basically done this task code in Jupyter Notebook by installing all the necessary libraries which can be run in my GPU system. There is no limit on GPU usage. By this no need to mount with any drive just have to copy the correct paths of the tasks dataset from the file where I have saved.

At first all the important imports have been taken, for best convolutional data taken as Conv2D for passing the 2D images with dense as create CNN layers, Adam best for optimizer, sklear.metrices uses for final metrices as f1 score and accuracy. Configure made as (128, 128) for make it better, batch size as 16 it can be make or convert into large but making large can make out of RAM, training for 30 times and num paths as 10000 which really make the training set best, my accuracy occurred at last epoch as 0.9672 which really impressive with very less loss. Then converts those images in numpy array to make it normalize pixel. Using Siamese Network CNN base model taking Dense(512) for best embeddings. Then trained the model to get best result and the model weights are saved in .h5 format.

In the dataset their was difficulty in matching classes in train and val as no similar data present and also not same classes, so for that some distortion image from the train dataset need to copy in the val dataset by the pyhon code only, the threshold need to low down and by this the evaluation metrices for validation give score pretty better than 0. The Evaluation Metrices are **VALIDATION SET :-** ACCURACY – 0.5628, PRECISION – 0.6347, RECALL – 0.4833, F1–SCORE – 0.5334 and **TRAIN SET :-** ACCURACY – 0.4829, PRECISION – 0.9009, RECALL – 0.8618, F1–SCORE – 0.8709.

CONCLUSION

TASK_A and TASK_B models were trained and evaluated to handle visually degraded facial images. The gender classification task achieved excellent accuracy and F1 scores. The face recognition task showed promising results considering the dataset difficulty. Both the tasks giving best results. Also checked with custom code and custom data which giving the output perfect with no problem.

The .h5 files are too large so it cannot be put in the git hub directly due to its limited size. So for that those file saved in Google drive and share the downloadable link in the git hub.