CW3 Mini project - Deeper Networks for Image Classification

Overview

Implementation and experimentation of image classification with MNIST and CIFAR10 dataset using deep networks: GoogLeNet, VGG and Resnet.
Models implemented:
1. GoogLeNet
2. VGG19
3. ResNet18
4. ResNet34
5. ResNet50

Submission Details

1. Report
2. **Code** folder has all the python files for the models which was executed on the GPU server, the best set up is kept in the codes
3. **Code** folder also has ipynb files for the plot and predictions, because after training the models in GPU server, inference was performed on the CPU
4. **Evidence** folder consists of all the log files for each of the runs along with the images of the loss, accuracies, and confusion matrix for all the models

Requirements

The codes should be run in the GPU servers. As school server was used for the experiments the below versions of libraries got installed:

```
pandas==1.2.4
torch==1.8.1
torchvision==0.9.1
numpy==1.20.2
seaborn==0.11.1
matplotlib==3.4.1
```

You might also need to change the CUDA device number, currently all are default to 0.

Unzip the folder and `cd` to the directory `Code` directory.

Approach 1:
Run `pip install -r requirements.txt` from terminal to install the required dependencies, if not already present

Approach 2:
If using Google Collab, then kindly add the below lines of code in the Google collab notebook and upload the python files in Google collab after mounting the drive (change the content directory if needed)

```
import os
from google.colab import drive
drive.mount('/content/drive', force_remount=True)
os.chdir("/content/drive/My Drive")
```

Execution

- After unzipping the submission folder, go to **Code**
- To execute the models you wish to run, please run the code in the GPU server:

- If executing in the school GPU server with environment set up with requirements you can execute the python codes for different models. An example has been provided below:
  Run `python cifar10_vgg19.py` if executing in a machine with GPU

- If executing in Google collab (once the steps mentioned in Approach 2 has been performed, run the below code in new line):
  Run `!python cifar10_vgg19.py`

- Once the model has been generated if you want to run the inference with the `Prediction_CIFAR10.ipynb` or `Prediction_MNIST.ipynb` on your machine with CPU. **Kindly**, change the path of the model to be used for inference in the ipynb file

- Finally, if you want to compare the models for loss and accuracies on training and validation set, you need to execute `plot_train_test_losses_for_all_models.ipynb`. However, please change the path to `PICKLE_DUMP` folder where the pickle files of various models get saved