Assignment 2

Instructions:

1) **Implement your codes in Python3. Packages can be used in each step.**
2) **Provide documentation for compiling and running the programs in a README file.**
3) **Place your ".py" files along with all the generated outputs and README file in a folder. Submit the zipped folder on Moodle.**

Download the given dataset and perform the following operations. **The number of epochs is to be decided based on the convergence of your model. You can use any optimizer**.

1. Image Classification Problem [50 marks]

a. Data Download: CIFAR10
b. Data Preparation
   i. There are 10 classes and six thousand images are given in each class.
   ii. Divide the train data into train-val splits. 80% for training and 20% for validation. The split should be in such a way that for each class 80% images should be in the train set and 20% images in the validation set. [10]
   iii. Use 5 different data augmentation technique and show that data augmentation improves the performance. [5]
c. Deep Learning Model [10+10]
   i. Use pretrained Resnet-50 from Pytorch Models for training.
   ii. Use pretrained EfficientNet-b0 from Pytorch Models for training.
d. Loss Function [5]
   i. Negative log likelihood (NLL) Loss
e. Test Metric [5+5]
   i. Percentage Accuracy on test set.
   ii. Compare the performance of these 2 model architectures.

2. Image Segmentation Problem [35 marks]

a. Data Download: Cityscapes
b. Data Preparation:
   i. The dataset consists of around 5000 fine annotated images and 20000 coarse annotated ones.
   ii. Randomly select 3500 images for training and 1500 images for test from the fine annotated images. [5]
c. Deep Learning Model [10]
   i. Use U-Net architecture for segmentation
d. Loss Function [10]
   i. Negative log likelihood (NLL) Loss along with DICE loss
e. Test Metric [5+5]
   i. DICE Score on test set.
   ii. Mean Average Precision on test set.

3. Prepare a report for both the above problems [15 marks]