EEE408 – ASSESSMENT 1

Assessment Number	1
Contribution to Overall Marks	20%
Submission Deadline	5-May-2019

Assessment Objective

This assessment aims at evaluating students' ability to exploit the deep learning knowledge, which is accumulated during lectures, and after-class study, to analyze, design, implement, develop, test and document image classification methods using deep learning. The assessment will be based on the Pytorch software.

General Guidelines

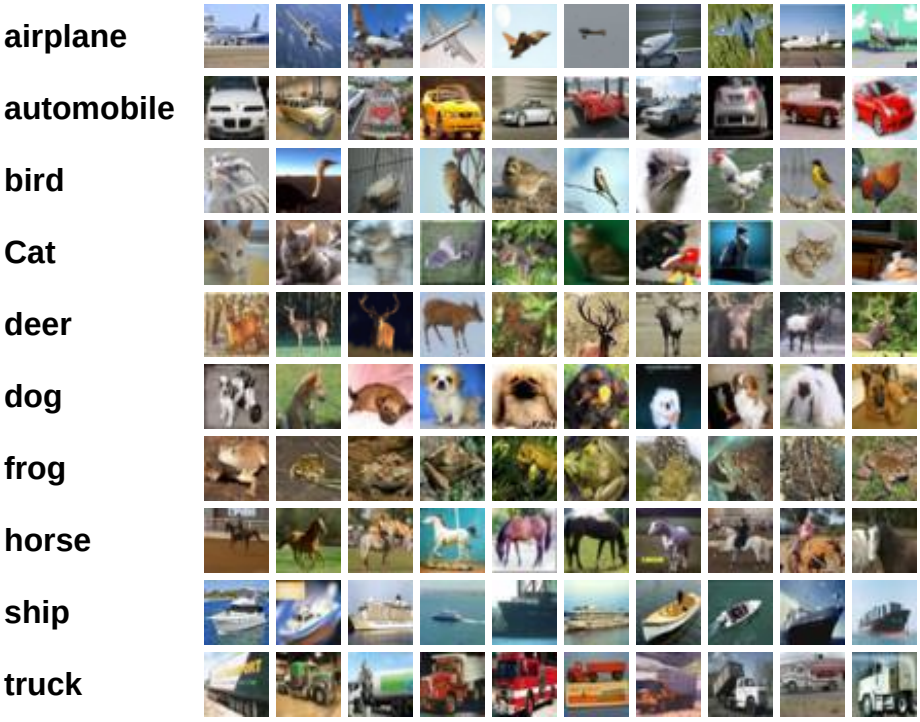
1. All your implementation source code are required to include in the report.
2. The final image classification performance that you obtain needs to be reported in the report. Meanwhile, the screenshot of the final performance result is also required in the report.
3. For the performance comparisons, the numeric results are required. Meanwhile, it is also important to include some subjective image examples.

Image Classification using Neural Network.

Overall Description:

Use the Pytorch software for image classification. The CIFAR-10 dataset consists of 60000 32x32 color images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images. The task is to train a neural network model for image classification, then use the model to test the classification accuracy on the test set.

Here are the classes in the dataset, as well as 10 random images from each:



Problem Specifications:

1. Please use the "trainval_net_cifar10.py" to train the image classification convolutional neural network (CNN). The network structure is specified in the file. Please draw an illustrative CNN network configuration figure for it, and explain the feature size in each network layer. Please also write down the number of parameters and number of neurons in each layer. (20%)

2. Plot a figure to show how training loss and testing loss change with training iteration number. Compare the training loss with the testing loss, and explain why this happens. (20%)

3. CNN network structure will affect the image classification performance. Please change the network structure by modifying the corresponding code in "trainval_net_cifar10.py" and provide the test accuracy with each new network structure. The modified code for all the network models should be included in the report. (20%)

   (The modifications should include 4 items: (a) half the channel number in each layer; (b) double the channel number in each layer; (c) change to CNN layer number from 3 to 0 and 1; (d) change the CNN layer number from 3 to 4 and 5.)

4. Data augment technique is commonly used for the deep learning training process. Please propose a data augment method, and train the CNN network specified in "trainval_net_cifar10.py" with the augmented dataset. Please write down the adopted data augment method and record the final test accuracy. (20%)

5. Please propose a method to boost the image classification performance, and detail your method and report the final image classification performance that you achieved. (20%)

Hints:

(1) You need to configure the environment on your PC at first.

(2) Your own or the new algorithm can be developed by modifying or combining the existing methods. In literature, there are many methods that lead to high cifar10 image classification performance, please refer to these methods listed in the following web page. http://rodrigob.github.io/are_we_there_yet/build/classification_datasets_results.html