Programming Exercises Problem 02 Report

Deep Learning for Engineers

Name: Jen-Hung Ho **Andrew ID:** jenhungh

(1) Structure of the Convolutional Neural Network:

In order to increase the variety and numbers of the inputs, I applied data augmentation methods such as RandomCrop, RandomHorizontalFlip, RandomAffine (shear and scale), and ColorJitter (brightness, contrast, and saturation) to the training dataset.

My Convolutional Neural Network has three convolution layer blocks, each of them contains two convolutional layers (same size padding, activation function: ReLU), two batch normalizations, one max pooling (kernel size = 2, stride = 2), and one dropout (p = 0.1). The channels increased from 3 to 64, 64 to 128, and 128 to 256 in each block. The size of the input image is 3*32*32, after the whole convolution process, the size of the output will become 256*4*4.

The fully-connected layer block contains two hidden layers (activation function = ReLU) with 1024 and 512 neurons. The criterion and optimization methods are Cross-Entropy Loss and Adam.

(2) Hyper-parameters

Batch Size of the training/test dataset: 200
Number of Epochs: 100
Learning Rate:
1 - 50 epochs: 0.001
51 - 100 epochs: 0.0001

(3) Visualization of the Training Process

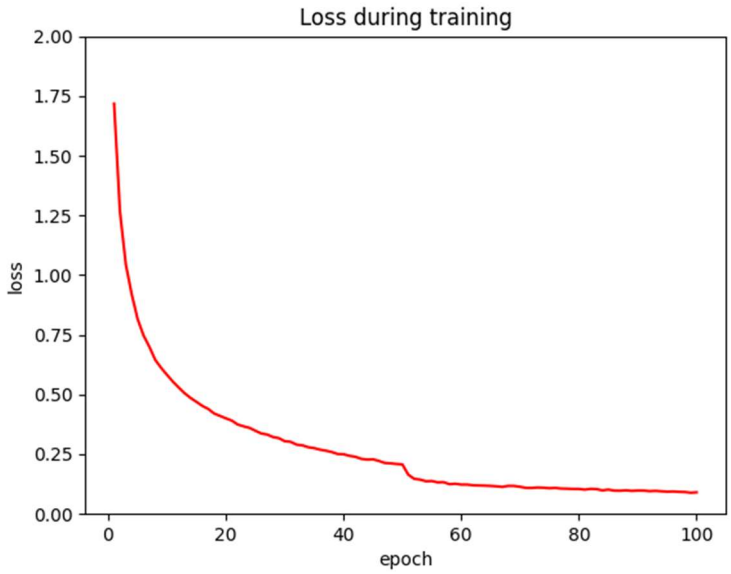

Figure 01. Loss during the Training Process

There are 50000 input images and the batch size is 200, which means the weight and bias will update 250 times in a single epoch. We print out the loss every 50 mini-batches. The training process is shown in the attached Training_Process.txt file.

(4) Final Performance

Accuracy of the network on the 10000 test images: 90.04 %