EECS118
Fall 2019
Mini Project – Deep Learning
Assigned on: 10/31/2019

In this mini-project, you are going to implement a CNN (Convolutional Neural Network) model which is trained among handwritten digit data and use the trained neural network to classify test data. The project is due on Thursday, November 14, 11:59 PM.

Deliverables

1. A .py training file.
2. A .h5 model file of the trained model.
3. A .py testing file that load your trained modal and output the accuracy.
4. Two screenshoots of the execution results of both python programs.

Keras & MNIST

In this project, you are required to use Keras, a high-level neural network API to implement a CNN. By changing the activation functions, number of layers, number of filters, one can tune the model to achieve the best prediction accuracy among the testing data.

The data set we use is MNIST, a handwritten digit data set that contains 60000 training images and 10000 testing images(images are 28*28 pixels in both categories).You can use mnist.load_data() to load the training and the testing data. We aim to use the minimum data to train a model with great accuracy. So even if there the 60000 examples of training data, you are asked to use only 20000 of them.

Requirements

Please follow the input/output format to design your own CNN model, use the first 20000 training data of MNIST to train it, and predict the whole testing data of MNIST. You can use multiple 2D convolutional filter layers, pooling layers, and fully-connected neural network layers to build the model. You can still use other modules in Keras, but make sure not to use module with pre-trained knowledge.

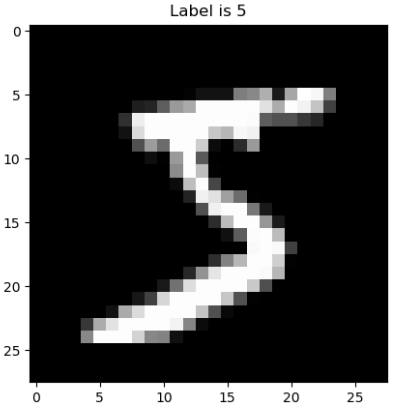
Input/Output format

For the training file:

1. Command line input:

```
python training.py
```

2. Input: The first 20000 data of the MNIST training data set.
   An example, a printed data image with its label is as follows:



3. Output: Save a .h5 trained modal.

For the testing file:

1. Command line input:

```
python testing.py model.h5
```

2. Input: (1) The whole MNIST testing data set which has 10000 images. (2) The model trained by the training program.
3. Output: The accuracy of the prediction result of our model (a ratio).