UNIVERSITY OF LINCOLN

CMP9137M Advanced Machine Learning

Workshop 3: Classification and Optimization in CNNs

https://attendance.lincoln.ac.uk

Access Code:

School of Computer Science

Laboratory of Vision Engineering

Aim: workshop 3

The aim of this workshop is to gain practical experience for image classification using Convolutional Neural Networks (CNNs)-with different optimization methods and various state-of-the-art architectures.

Task 1: workshop 3

Image classification of the CIFAR10 dataset using the following CNN structure. The CIFAR10 dataset contains 60,000 color images in 10 classes, with 6,000 images in each class. The dataset is divided into 50,000 training images and 10,000 testing images. The classes are mutually exclusive and there is no overlap between them.
data from https://www.cs.toronto.edu/~kriz/cifar-10-python.tar.gz

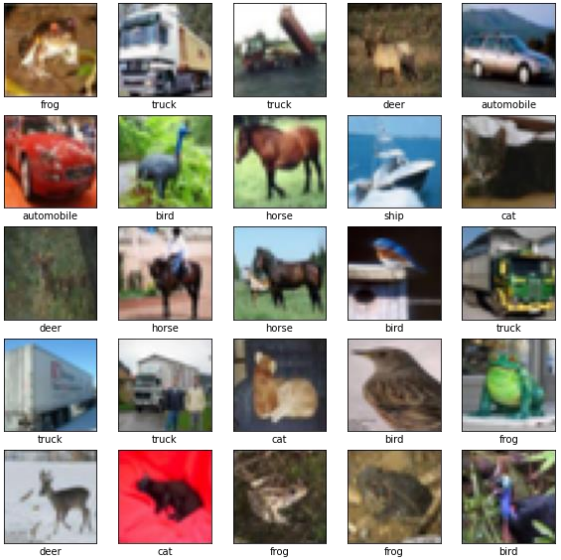
```
model.add(layers.Conv2D(32, (3, 3), activation='relu', input_shape=(32, 32, 3)))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(64, (3, 3), activation='relu'))
model.add(layers.MaxPooling2D((2, 2)))
model.add(layers.Conv2D(64, (3, 3), activation='relu'))
```

- Training a simple Convolutional Neural Network (CNN) with standard SGD+Momentum optimizer to classify CIFAR images.
- Tunning the learning rate as well as hyperparameters in the SGD and Momentum to observe the effects in the performances.
- Comparing the performances (converging speed) among different optimization methods: SGD+M, ADAM, RMSprop and more)

Please refer to the tutorials on the https://www.tensorflow.org/tutorials/images/cnn
Feel free to use the offline training with your PC or online training with Google Colab notebooks

Task 2: workshop 3

Image classification of the CIFAR10 dataset using using state of arts CNNs (including: VGG16, Resnet 50, Resnet 101, and more).



- Training a CNN (VGG16, Resnet 50, Resnet 101) to classify CIFAR10 images.
- Create plots of loss and accuracy on the training and validation sets for each network. (visualization of the results)
- Compare their performances, find out the best model for this task.

Please refer to the tutorials on the https://www.tensorflow.org/tutorials/images/cnn
And API https://www.tensorflow.org/api_docs/python/tf/keras/applications
Feel free to use the offline training with your PC or online training with Google Colab notebooks