096260 - Deep learning course: Convolutional networks exercise

Submission date: 4/1/2017

1 Exercise

In the following exercise you will create a classifier for the CIFAR-10 database. I strongly recommend to overview tutorial 5. You should write your own training code and satisfy the mentioned constraints. The performance parameters appears below. You can submit your work only after achieving these performance levels.

1.1 Submission instructions

Submission will be in pairs (course partners) and will contain a short pdf report containing:

- Model architecture description, training procedure (data augmentation, regularization, optimization details etc).
- Two convergence graphs for your final model - for error and loss as a function of time (epochs). Each graph should depict both training and test performance.
- A short summary of your attempts and conclusions.
- In your report, you should evaluate 2 different optimization methods and for each you should attach: best accuracy, num of epochs to get the best accuracy, a convergence graph for the train and test error.
- In your report, you should evaluate 3 different batch normalization methods (or combination of them) and for each you should attach: best accuracy, num of epochs to get the best accuracy, a convergence graph for the train and test error.

In addition, you should also supply:

- Code able to reproduce your results - we might test it on different variants on these datasets.
- The trained network (with trained weights) in Torch format. I recommend to use the following api for that:

  serialization.md

  usage: how-to-save-a-trained-neural-network-model-to-file
- A function that loads your's trained network and returns the average error on the test set.

1.2 Convolutional Network

Write a complete training procedure for a classification network on CIFAR-10 dataset. Design and train your network so that it will satisfy the 2 following goals:

- Final accuracy on the test-set should be $> \mathbf{80}\%$
- Number of trainable parameters (weights) within the network should be $< \mathbf{50{,}000}$ **.**

1.3 Data

You should use the dataset, in Torch format, in the same way as in tutorial 5. You should split the data to train and test set according to: Cifar10BinToTensor.lua (**as we did in the class**).

You will train the network **ONLY** on:
trainset = torch.load('cifar.torch/cifar10-train.t7')
and test the network on
testset = torch.load('cifar.torch/cifar10-test.t7')

1.4 Tips

A useful source (with links to relevant papers) is Cifar - Torch blog entry

1.5 Grades policy

- Successful submission - 55 points.
- Report - 25 points.
- Competition - 20 points