CSCI-494 Deep Learning Homework 2
4/10/2018
Due date: 16 October 2018, 23:59

In this homework, you are asked to design a Convolutional Neural Network (CNN) architecture to a perform an image classification on a database with 10 classes: airplane, bird, dog, frog, horse, apple, strawberry, kiwi, lemon, grape.

To train your network, please use data under the data1/train directory for the first 5 classes (airplane, bird, dog, frog, horse) taken from the Cifar-10 dataset, where image resolutions are 32x32. For the last 5 classes (apple, strawberry, kiwi, lemon, grape), please use the training data under data2/train directory where images are 100x100 but you will scale them down to 32x32 to be consistent with the first data. The test data may be found under data1/test and data2/test.

Please write your code in Pytorch only.

Specific points:

- Design your own CNN architecture
- Train it with the datasets as described above
- If you wish you may use data augmentation techniques to increase the training set
- Reserve about 10% of training set as validation
- Play with the different parameters of your architecture, which includes adding or removing convolution layer, pooling layer, activations (ReLU, softmax, tan, etc) fully connected layer, changing the learning rate, number and size of filters, dropout, stride, padding, loss function, optimization etc.
- Observe how your modifications effect the classification accuracy
- Write down a 2-4 page report describing all your findings including classification rate, time it takes to perform the classification, CNN architecture, influence of different layers on the success, and on the time in detail.
- For testing, write an other program that loads your previously trained model and a set of test images, and produce the classification label for each test image.

Reports should be written in the IEEE manuscript format:
https://www.ieee.org/conferences/publishing/templates.html

Your report should have the following sections: abstract, introduction, related work, description of the technical work as outlined above, experiments, conclusions, and references. Your grade will be determined based on two things:

- Your code's classification success on some dataset, which we will not distribute,

- The likelihood of the acceptance of your paper to a respectable conference.

Notes:

- This homework can be done alone or in a group of 2 at most.
- The code you submit must be yours. If you take some portion of your code from some resource, clearly indicate that in your report. In this case, at least 80% of the code must be yours.
- For grading this homework, you may be asked to explain your code in person.

Submission

Please zip all your files and submit them through Moodle before the deadline.

Late submissions will lose 20 points for each day.

In the event that academic misconduct such as plagiarism or cheating is discovered, the student will receive no credit for the work, and the event reported to the Dean of your school. Please consult the Academic Integrity Statement given in the syllabus for more details about academic honestly.