Final Project for ECE 662 Deep Learning with Python
Due Thursday December 14, 2023 by 4:00 p.m.

Problem Statement State the problem you are going to work on.

1. What is the dataset you are using? (CIFAR100, GoogleDraw, etc.)
2. Present any background information of your proposed problem (classification accuracies given in the literature, etc.).
3. Present and propose any new ideas/approaches to the problem that you might consider in your work.

Progress Report **Due Thursday November 30, 2023.**

1. A progress report of 1-2 pages should (at least) include answering the problem statement questions above.
2. Note that you are to use PyTorch. You can, of course, get ideas from the internet, but be sure to properly **cite** them.
3. (Not required) Give any preliminary accuracy results you might have.

In addition to the Problem Statement, the **Final Report** should be *double-spaced single-column* and contain the following information:

Dataset Describe the dataset you choose.

1. What is the dataset and how big is the one you chose?
2. From your dataset, what is the size of the `training_data`, `validation_data`, and the `test_data`.

Network Architectures Give the network architectures you considered for your problem.

1. Number of inputs.
2. For each Convolutional layer give the dimensions of the filter (mask/window) for that layer and the number and dimensions of the maps.
3. For each Pooling layer give how much you down sampled and the dimensions of the resulting pooled maps.
4. For each Fully Connected (FC) layer give the number of hidden neurons.
5. Describe your output layer and the cost function used (squared error, cross-entropy, maximum likelihood, etc.)
6. Give the values of the hyper-parameters used (mini-batch size, η, p_{dropout}, etc.)
7. Give the accuracy on the `validation_data` and the `test_data`.

Setting up a Table to summarize your results is an effective way to present the various different architectures and sets of hyper-parameters values you considered.

Based on the classification accuracy on the `validation_data`, explain your final choice of network architecture and hyper-parameter values.

Results Give the full results of your final design.

1. What was the performance on the test data?
2. How do your results compare to the results given in the literature?

References

1. Give the references of where you got your information. For example, Michael Nielsen's book. If you got something online, then give the source including the link.
2. Give proper citation of any ideas you got from the internet for your project.

General Comments

The proper way to cite work is to put the complete reference at the end of the report. It is okay to put in a hyperlink if you wish.

Do a formal report in the proper context. In the case the proper context is the terminology and concepts covered in the course. All other new ideas, terminology, etc. should have a brief explanation.

Don't use terms like "best possible accuracy" or "optimal results". The "best accuracy" is 100%. Further, "optimal results" implies that the accuracy you got is the best possible and no one else could get better.

Handin

1. Your final report.
2. The files (`.ipynb`, `.py`) needed to run your program (not the data). That is, if I don't understand something in your report I want to be able to perhaps understand it from your code.

Academic Honesty

You are expected to do your own work. Any instance of plagiarism will result in a grade of zero on the project.

Grading Scheme

Progress Report (1-2 pages)	0%
Design Choices and Justification	33%
Performance	33%
Report Presentation, Clarity, English Usage, etc.	33%

Existing Accuracy Results for the MNIST, CIFAR, SVHN datasets

https://rodrigob.github.io/are_we_there_yet/build/classification_datasets_results.html#43494641522d3130

Dataset for CIFAR:

https://www.cs.toronto.edu/~kriz/cifar.html If you use CIFAR then grab at least 20 categories from the CIFAR100.

Dataset for QuickDraw

https://quickdraw.withgoogle.com/data

Dataset for SVHN

http://ufldl.stanford.edu/housenumbers/