ENGR-E 399/599 & CSCI-B 590
Deep Learning Architecture and Hardware Acceleration
Lab 2

Preliminary

- Go to https://colab.research.google.com/drive/1gCgtlnMPVWY0l1ra8ssS0EzJiWaVR4Pk#scrollTo=9XHd5ExbUIUg

- To get the latest stable version of PyTorch, change code block (1) to:

```
!pip3 install torch==1.10.0+cu111 torchvision==0.11.1+cu111 -f https://download.pytorch.org/whl/torch_stable.html
```

- Go through the tutorial to learn the PyTorch's basic building blocks for training a deep learning model

Lab 2-requirements

- Task 1:
- (20 points) Implementing LeNet-5 by modifying `class Lenet(nn.Module)`
- (10 points) Train this model on the MNIST train dataset and evaluate the classification accuracy on the MNIST test dataset. What is your initial test accuracy?
- (20 points) Apply the training methods (at least 2 approaches) we discussed in ***Lecture 8&9*** to improve the accuracy of your model. How do these methods affect your test accuracy? What is the best accuracy you achieved?
- ***NOTE****: A >98% test accuracy is expected for LeNet-5. Submissions with less than 98% accuracy will be deducted 5 points in final grades*

Lab 2-requirements

- Task 2:
- (20 points) Implementing AlexNet by modifying `class Alexnet(nn.Module)`
- (10 points) Train this model on the CIFAR10 train dataset and evaluate the classification accuracy on CIFAR10 test dataset. You may need to resize the image data to ensure this model trainable on the CIFAR10 dataset.
- (20 points) Apply the training methods (at least 2 approaches) we discussed in ***Lecture 8&9*** to improve the accuracy of your model. The training methods used in this model should be different from that used in LeNet-5 model. How do these methods affect your test accuracy? What is the best accuracy you achieved?
- ***NOTE****: A >75% test accuracy is expected for AlexNet.*

Lab 2-submission guidelines

Lab 2 is due on 11:59 pm, 3/28/2023

Submit format: Jupyter Notebook + Report PDF

- Your code should contain both code snippets and code comments to ensure readability.
- Your report should explain your code and shows all your steps, and highlights:
  - ✓ (1) > 4 training methods: at least 2 training methods for each of the two model you are working with;
  - ✓ (2) how it affects your model accuracy;
  - ✓ (3) your explanation and thoughts;
  - ✓ (3) A screenshot shows the best test accuracy you achieved and explain how it achieved.

Academic Integrity

- Please write your code by yourself without copying any code from online resources. We will use a plagiarism checker. If there are any evidence of plagiarism, you will get zero point in this assignment.
- You can use some general libraries of Python, including Python Pillow, Numpy, Pytorch. But you should not use any existing libraries related to the main requirement of this Lab. For example, you can use torchvision.datasets.MNIST to download dataset, but you cannot load AlexNet by using torchvision.models.alexnet.
- You are welcome to discuss this assignment with others, but please don’t copy others answer.

Reference

- NumPy tutorial

http://cs231n.github.io/python-numpy-tutorial/

- PyTorch master documentation

https://pytorch.org/docs/stable/index.html