Homework 2 for DTSC740 (Deep Learning) Due Nov 26, 2023

(50 points) In this problem, you are asked to train and test a fully-connected neural network for entire MNIST handwritten digit dataset. Some information of the network is as follows:

  - Its structure is 784-200-50-10. Here 784 means the input layer has 784 input neurons. This is because each image in MNIST dataset is 28x28 and you need to stretch them to a length-784 vector. 200 and 50 are the number of neurons in hidden layers. 10 is the number of neurons in output layer since there are 10 types of digits.
  - The two hidden layers are followed by ReLU layers
  - The output layer is a softmax layer

- Use deep learning framework (Pytorch or Tensorflow) to train and test this network. You are allowed to use the corresponding autograd or nn module to train the network.
- (Optional - maybe a good choice for your project) Use only Numpy (which can be used to load the data MNIST) or Keras to train and test this network. You are NOT allowed to use deep learning framework (e.g. Pytorch, Tensorflow etc.) and the corresponding autograd or nn module to train the network.

  Performance Requirement and Submission:

  - The test accuracy should achieve above 95%
  - Submission should include your source codes and screen snapshot of your train and test accuracy, plus the training time

  Suggestion for hyperparameter setting (not necessary to follow):

  - Learning rate can be set as 0.01
  - If you choose to use mini-batch SGD, the batch size can be set as 128
  - Number of epochs can be set as 10.

What to submit:
Submit a PDF-version report for this problem, including source codes and print screen results.