

## Assignments due on 11/04/2021

### Assignment 6a

- a) In this assignment, we run train and test the classification of CIFAR 10 datasets using VGG 16
- b) Download the VGG 16 architecture pytorch code.
- c) Implement following modules with your own code
  - a. Batch normalization function. Use the function for convolution layers and dense layers
  - b. Implement dropout function. Use the dropout function for each dense layer
  - c. Add L2 regularization term with your cross entropy loss.
  - d. Use Xavier initialization for your weights. Understand how s the xavier initialization works.
  - e. Implement a learning rate scheduler algorithm. Linear/Cosine/square root
  - f. Write normalization function to normalize your input data to standard normal. Std: .5, mean: .5
  - g. Implement a augmentation function that will create five different versions of one image. Use the five versions with the original one for training. You can create augmented images from all the training data and keep them in a folder with their label information. Then use the proper data loader for training.
- d) Write codes to train the VGG 16 model with train dataset from CIFAR. You can use your 2 layer NN for multiclass codes to train the VGG 16 model. In this case the Net/model will be the VGG 16. Use 80% as training, 20% as validation data from whole training data
- e) Plot loss curve and accuracy curve for training and validation
- f) Accuracy and F1-score on the test set.
- g) Print Confusion Matrix

### Assignment 6b

- a) Import Pytorch.
- b) Download the VGG 16 architecture pytorch code.
- c) Write codes to train the VGG 16 model with train dataset from CIFAR.
- d) Plot train
- e) Now try to search your optimal hyper parameters.
  - i. Say learning rate
    - 1. Learning rate: show loss curve for training and validation for 5 different learning rate
- f) Take the model with best learning rate for your validation performance and test with test data.