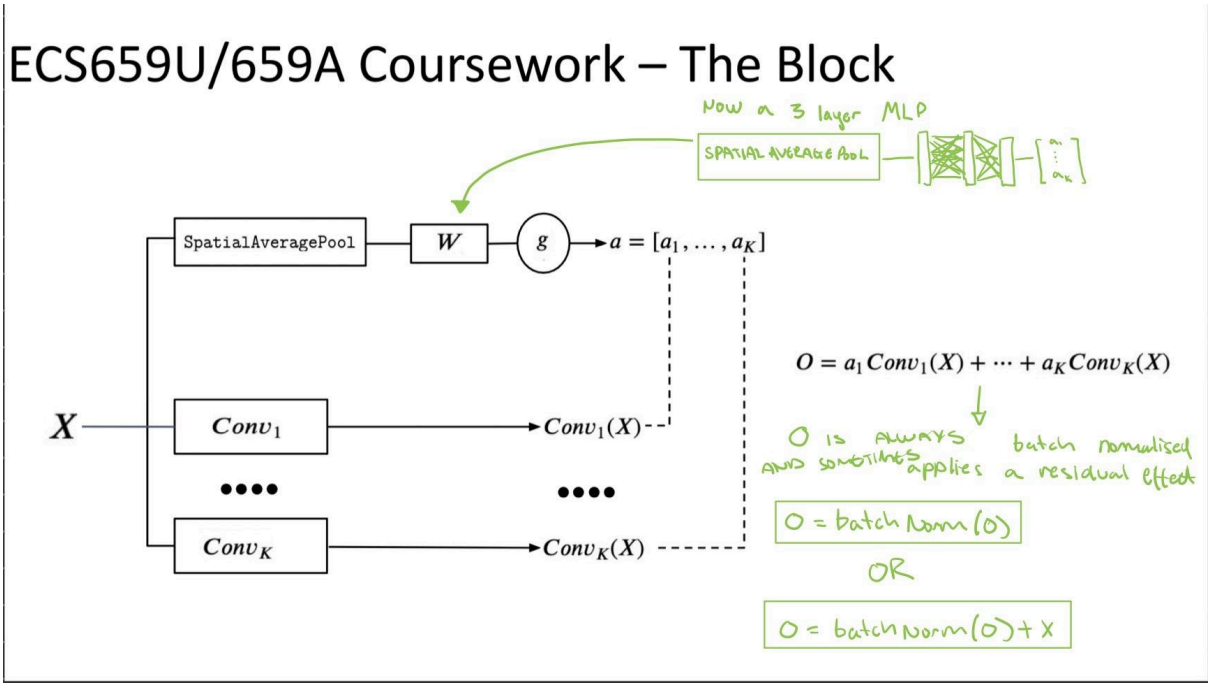
ECS659U/A: NEURAL NETWORKS & DEEP LEARNING COURSEWORK

Task 1)
The dataset is read via the torchvision.datasets.CIFAR10 method. It is downloaded to the '../data' directory and is split up between training and testing (signified by train=True and train=False)

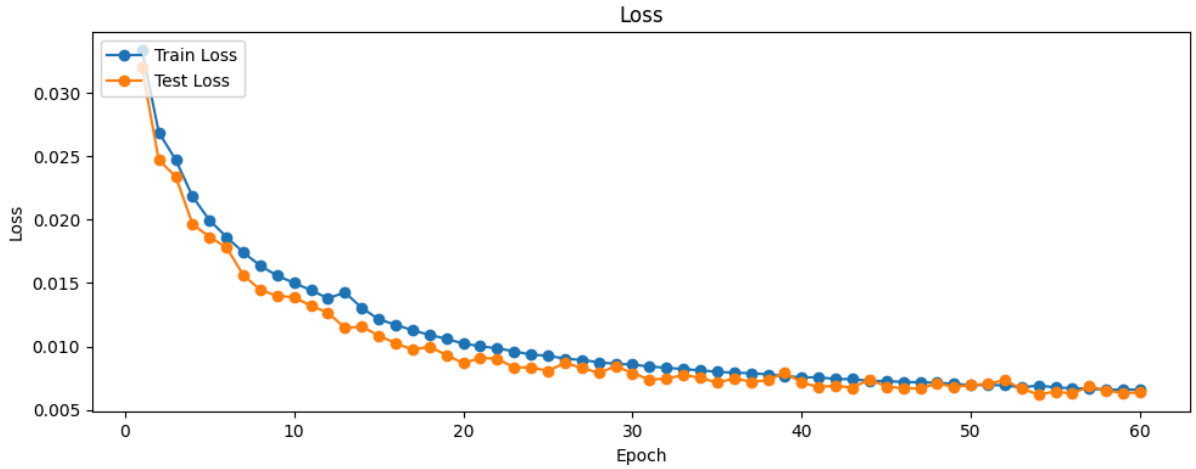
The same method then instantiates two data loader objects one for training (train_iter) and one for testing (test_iter), these two objects are returned as a tuple

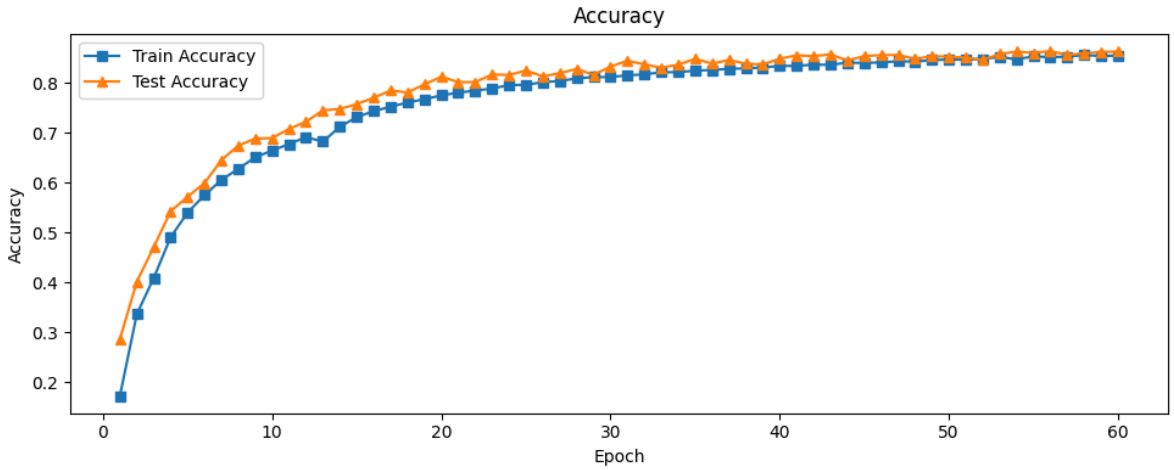
Task 2)
The model has 7 Blocks, each block is batch normalised before sending its output to the next input. There is an Average Pooling layer after the 2nd block and two Max Pooling Layers after blocks 4 and 7. Blocks 4,6,7 have a residual added onto its output. Additions made to the block can be seen in the diagram below. I have added an additional 2 extra layers (3 Layer MLP in total) to calculate the a vector. After each pooling layer there is a dropout with some dropout probability



p

Task 4)





Training consists of calculating prediction from the test set batch and using the loss to numerically gather their accuracy. It then uses this to calculate the derivative of the loss with respect to the weight and make the corresponding changes in each weight. After it does this it then tests the accuracy on a different test set, while learning is disabled and no data augmentation applied, it gathers the accuracy by calculating the number of correct/total and saves it to its respective epoch. It repeats this process for all epochs

Hyperparameters:

- Optimizer - Adam with a learning rate of 0.002, and weight decay of 1e-5 with default parameters betas = (0.9,0.999) and eps = 1e-8
- Batch Size is 64
- K (number of convolutions per block) = 6

- Number of blocks - 7 Blocks
  Note, each block has varying convolutions, either 5x5 Conv() with padding = 2 or 3x3 Conv() with padding 1. Each block group doubles the number of channels from 32->64->128

- The MLP classifier has 3 layers, each layer outputs a vector of sizes:

Layer 1 -> 1024
Layer 2 -> 512
Layer 3 -> 10 (output)

- The MLP in the block consists of 3 layers. Each layer has output size:
  Layer 1 -> 512
  Layer 2 -> 512
  Layer 3 -> 6

Task 5)
Training ended on epoch : 60
Accuracy ended with a training value of 0.85546 and test value of 0.8635
Loss ended with a training value of 0.006585272302925587 and a test value of 0.00637160148024559