IE 534 - Homework 4

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1 Instructions

Part A: Build the Residual Network specified in Figure 1 and achieve at least 60In the homework, you should define your "Basic Block" as shown in Figure 2. For each weight layer, it should contain 3 x 3 filters for a specific number of input channels and output channels. The output of a sequence of ResNet basic blocks goes through a max pooling layer with your own choice of filter size, and then goes to a fully-connected layer. The hyperparameter specification for each component is given in Figure 1. Note that the notation follows the notation in He et al. (2015).

Part B: Fine tune a ResNet-18 model and achieve at least 70 percent accuracy.

2 Implementation

For part A, the network is implemented as in the homework. There is the initial convolution, followed by 4 sets of basic blocks. The output of the basic blocks are then put through a max pooling layer, and sent through three fully connected layers. The three fully connected layers are used to reduce the number of layers before the size 100 output. Since this network is not pre-trained, it took a long time to reach the required accuracy of 60 percent. In my test, it took 80 epochs, but my learning rate may have been set to decay too quickly, and performance in from-scratch training could be improved. Random image-flipping (vertical and horizontal) as well as random crops were used for data augmentation.

For part B, the same code as Part A was used for training and validation, but with some modified transformations and a pretrained ResNet18 as the network. In this case, the validation accuracy started around 30 percent, and took 17 epochs to reach the required 70 percent accuracy. As with Part A, this training time seems to be higher than others are reporting on Piazza. For future homeworks, I will look into more optimal hyperparameters and parameter initialization strategies to improve from-scratch training time. Overall, this homework was very illustrative of the power of transfer learning, and I will definitely use pre-trained models to speed up learning in the future.