

IE 534, homework 4

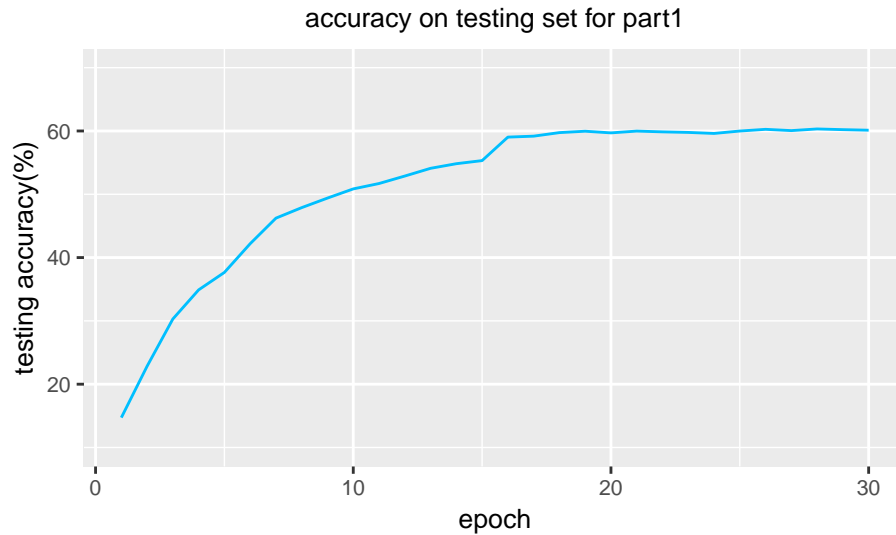
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Part 1

The objective of this part is to build a residual network to classify different images in the CIFAR100 dataset. The dataset is divided into training set and testing set. The residual network is built on the training set and the performance is evaluated on the testing set. The input image is $X \in \mathbb{R}^{32 \times 32 \times 3}$. The output is a vector of probabilities for the potential image classes of size 100. The most likely outcome is the outcome with the highest probability.

The residual network uses dropout with $p = 0.2$, trained with ADAM, and performs data augmentation by random vertical flipping and random cropping. The 'Basic Block' is defined as homework requirements. For each weight layer, 3×3 filters are contained. The output of a sequence of the ResNet basic blocks goes through a max pooling layer with the filter size of 2 and stride 2, and then goes to a fully-connected layer.

The number of epochs is set to be 30. After 26 epochs, the testing accuracy keeps above 60%, which are 60.26%, 60.06%, 60.32%, 60.21%, 60.12%, respectively. The testing accuracy after each epoch are plotted as below:



Part 2

The objective of this part is to load a pre-trained ResNet-18 model and add a fully-connected layer to classify different images in the CIFAR100 dataset. The input size for the pre-trained model is 224×224 . The output of this part is a vector of probabilities for the potential image classes of size 100. The most likely outcome is the outcome with the highest probability.

The images in CIFAR100 dataset are up-sampling to size 224×224 . The residual network trained with ADAM, and performs data augmentation of CIFAR100 dataset by random vertical flipping and random cropping.

The number of epochs is set to be 20. After 13 epochs, the testing accuracy keeps above 70%. The testing accuracy after each epoch are plotted as below:

