VGG-16 on Cifar-100 dataset

Dataset

Cifar-100 is dataset which has 100 classes containing 600 images each. There are 500 training and 100 testing images per class. The only preprocessing we must do with data is subtracting the mean RGB value, computed on the training set, from each pixel.

Model

We will use 13 convolutional layers starting from 64 neurons and finishing with 512 neurons. Will do batch normalization and ReLU after each layer. We will have 3 residual connections from 2 to 5 layers, 6 to 9 layers and 10 to 12 layers. And finally 3 Fully Connected layers 4096,4096 and 100.

Training

We use PyTorch library to build our network. First we did data augmentation (Random crop and Horizontal flip). Then tuned this hyperparameters:

· **Epochs** = 200
· **Batch size** = 256
· **Optimizer** = Adam by regularization weight decay(L2 penalty multiplier = 5 · 10e−4)
· **Dropout** = 0.5 (2, 4, 7, 10, 13 conv. layers and first two fully-connected layers)
· **Learning rate** = 10e−3 and decreased by a factor of 10 at the milestones 40, 70, 90, 110.

Conclusion and results

As a metric we used accuracy. When we began from the small 5 layer network we had 32 % of accuracy. Increasing the size of layers and neurons and adding data augmentation we get 45% accuracy. After that we did batch normalization and added residual connections. Doing hyperparameter tuning finally we get 50% accuracy.