

Problem Statement:

Train a deep convolution network on a GPU with PyTorch for the CIFAR10 dataset. The convolution network should use (A) dropout, (B) trained with RMSprop or ADAM, and (C) data augmentation. For full credit, the model should achieve 80-90% Test Accuracy.

Solution:

Test Accuracy = 85%

Train Accuracy = 92.2%

Number of epochs = 100

Learning Rate = 0.0001

Optimizer Used: ADAM

Dropout Probability = 0.2

Data Augmentation Techniques: Random Crop and Random Horizontal Flip

Convolution Network Model Architecture:

- ⇒ Convolution layer 1: 64 channels, $k = 4$, $s = 1$, $P = 2$.
- ⇒ Batch normalization
- ⇒ Convolution layer 2: 64 channels, $k = 4$, $s = 1$, $P = 2$.
- ⇒ Max Pooling: $s = 2$, $k = 2$.
- ⇒ Dropout
- ⇒ Convolution layer 3: 64 channels, $k = 4$, $s = 1$, $P = 2$.
- ⇒ Batch normalization
- ⇒ Convolution layer 4: 64 channels, $k = 4$, $s = 1$, $P = 2$.
- ⇒ Max Pooling → Dropout
- ⇒ Convolution layer 5: 64 channels, $k = 4$, $s = 1$, $P = 2$.
- ⇒ Batch normalization
- ⇒ Convolution layer 6: 64 channels, $k = 3$, $s = 1$, $P = 0$.
- ⇒ Dropout
- ⇒ Convolution layer 7: 64 channels, $k = 3$, $s = 1$, $P = 0$.
- ⇒ Batch normalization
- ⇒ Convolution layer 8: 64 channels, $k = 3$, $s = 1$, $P = 0$.
- ⇒ Batch normalization, Dropout
- ⇒ Fully connected layer 1: 500 units.
- ⇒ Fully connected layer 2: 500 units.