

# CSE 455 Homework 5

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August 21, 2020

## 1 Installing PyTorch

Done!

## 2 Find the best network

### 2.1 Training a classifier using only one fully connected Layer

See Figure 1. We can say that the model successfully trained since the loss is decreasing throughout the training process and there is a healthy gap between the training accuracy and testing accuracy.

### 2.2 Training a classifier using multiple fully connected Layers

See Figure 2. The training is not successful because the testing accuracy plateaus whereas the training keeps increasing.

#### 2.2.1 Question

See Figure 3. The model accuracy is significantly worse than the previous model. This is because the model is expressively limited since it has less non-linearity. The model can actually become just as good as LazyNet since without activations, the forward pass is just a couple of matrix multiplications, which is nothing but a single matrix multiplication by

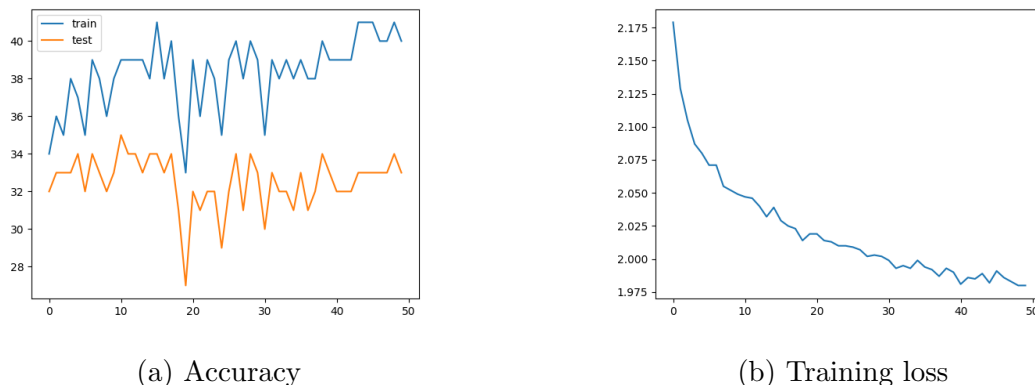
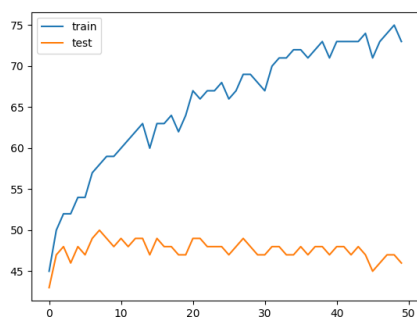
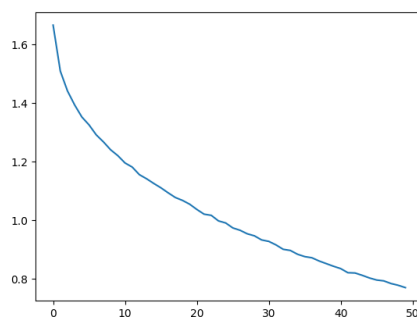


Figure 1: Training result of LazyNet

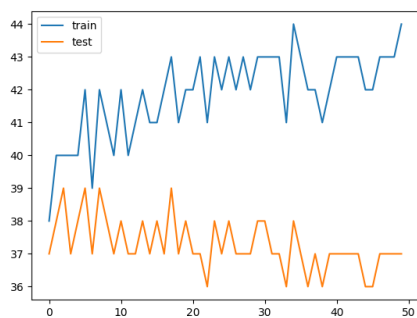


(a) Accuracy

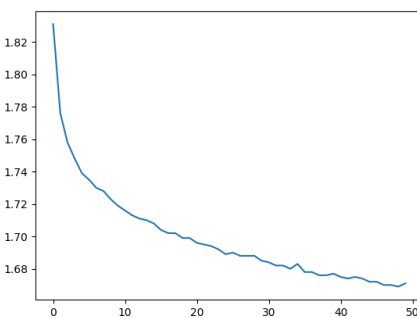


(b) Training loss

Figure 2: Training result of BoringNet



(a) Accuracy



(b) Training loss

Figure 3: Training result of BoringNet without activations

the composed matrices. But somehow, by separating the weight update process in back propagation, it achieves a slightly higher accuracy than LazyNet.

## 2.3 Training a classifier using convolutions

### 2.3.1 Question

## 3 How does learning rate work?

## 4 Data Augmentation

## 5 Change the loss function