

Deep Learning HW2

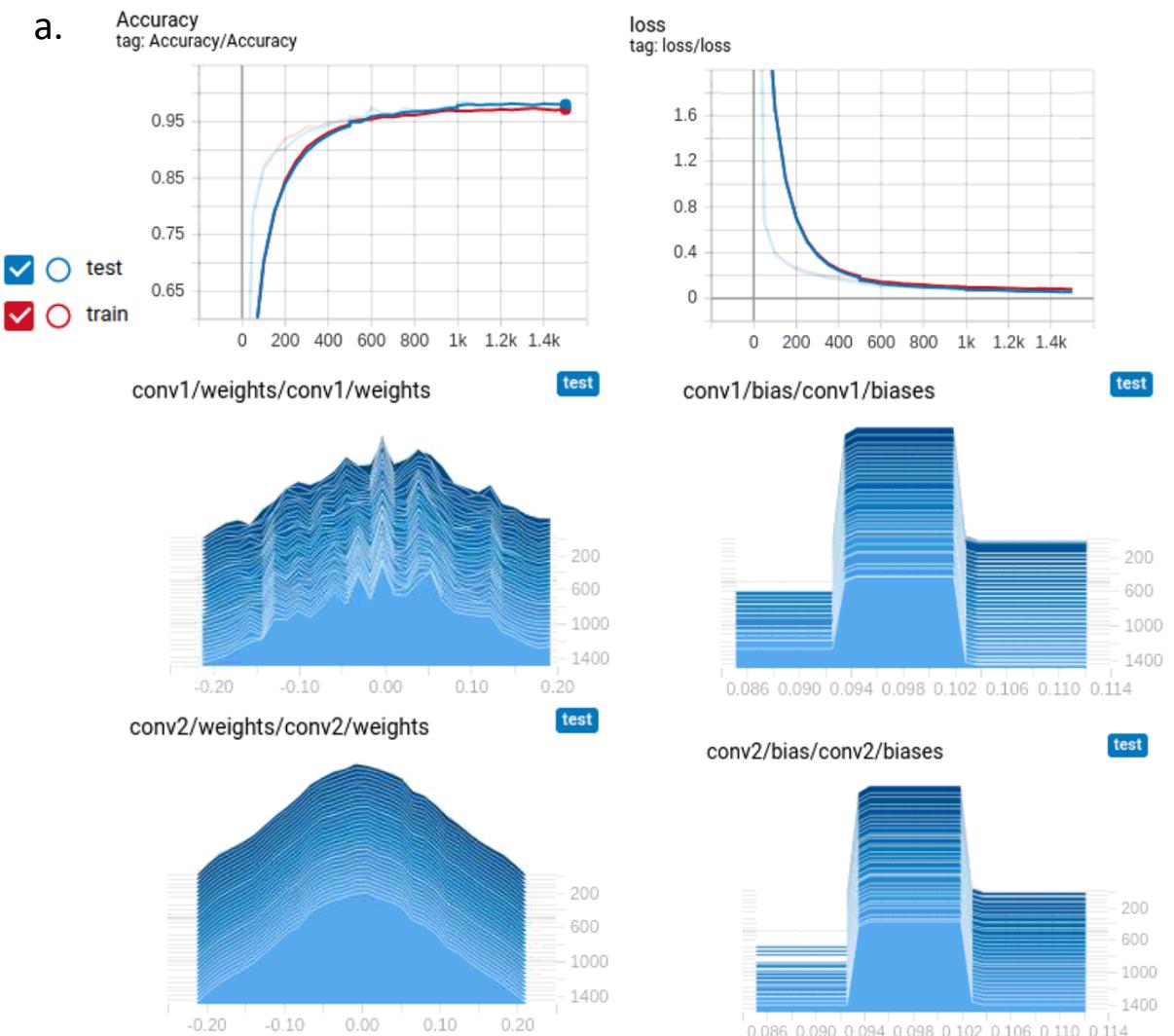
0851924 許朝鈞

1. Using Convolutional Neural Network for Image Recognition

Network architecture:

Inputs[28*28*1]

-> conv_1(patch: 5*5)[28*28*32]->relu->max_pool(2*2)[14*14*32]
-> conv_2(patch: 5*5)[14*14*64]->relu->max_pool(2*2)[7*7*64]
-> fc_1[1024]->relu->
-> fc_2[10]->softmax



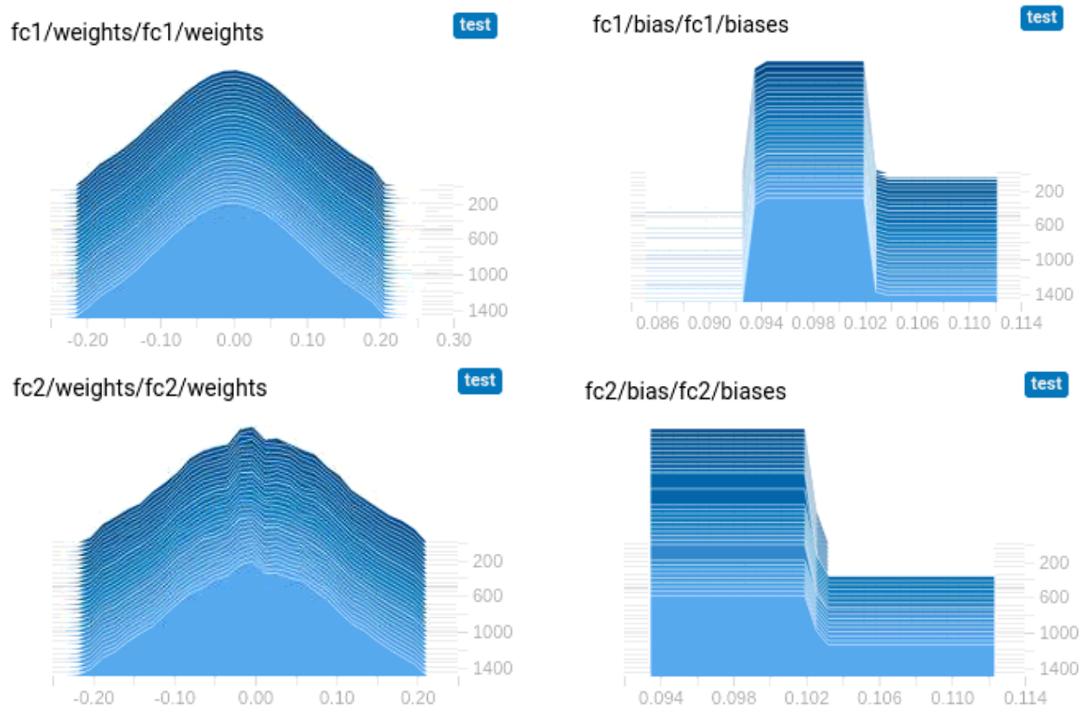
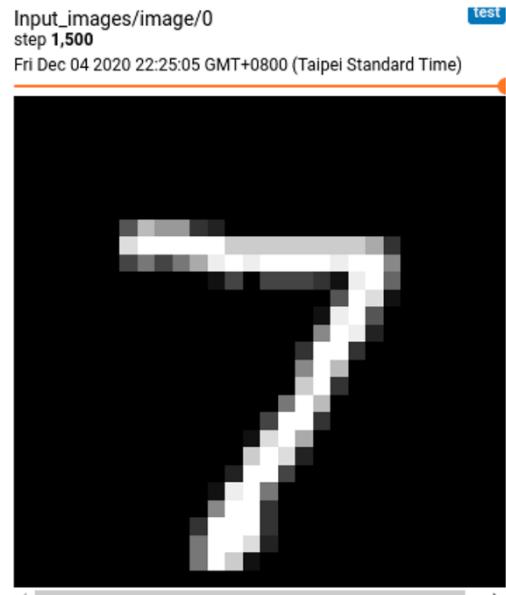


Fig. 1: Training accuracy, learning curve, and histograms of layers

b.



pred: 4, label: 9



pred: 7, label: 7

Fig. 2: Examples of correctly classified and miss-images

C.

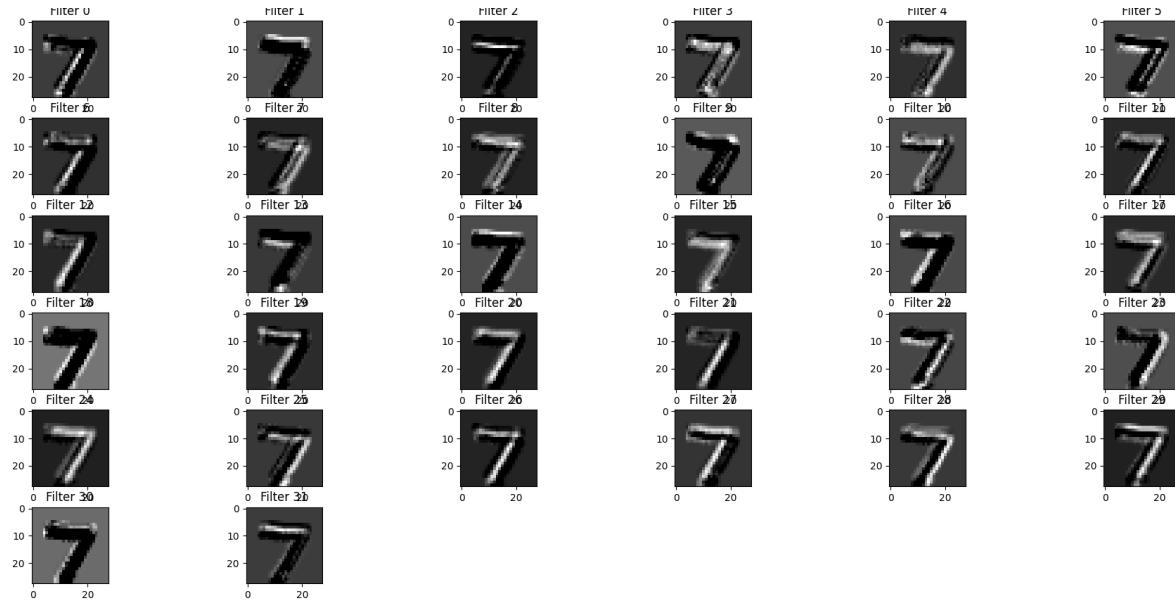


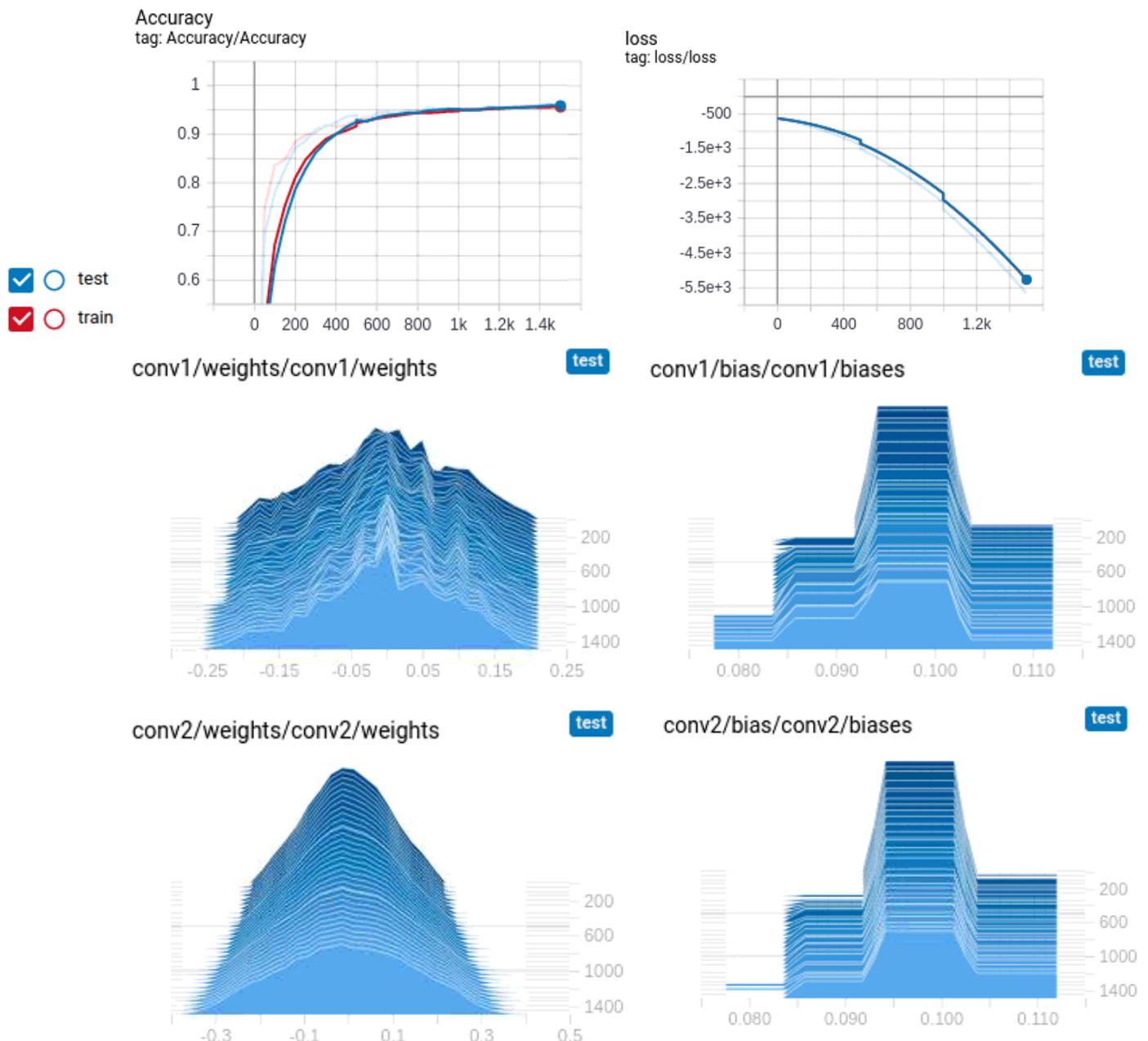
Fig. 3: Feature map of the first convolutional layer



Fig. 4: Feature map of the second convolutional layer

The feature map has been more uninterpretable as the convolutional layer getting deeper due to the extraction by the convolution filter, but it may made the network learn how to classify the number of the picture.

d.



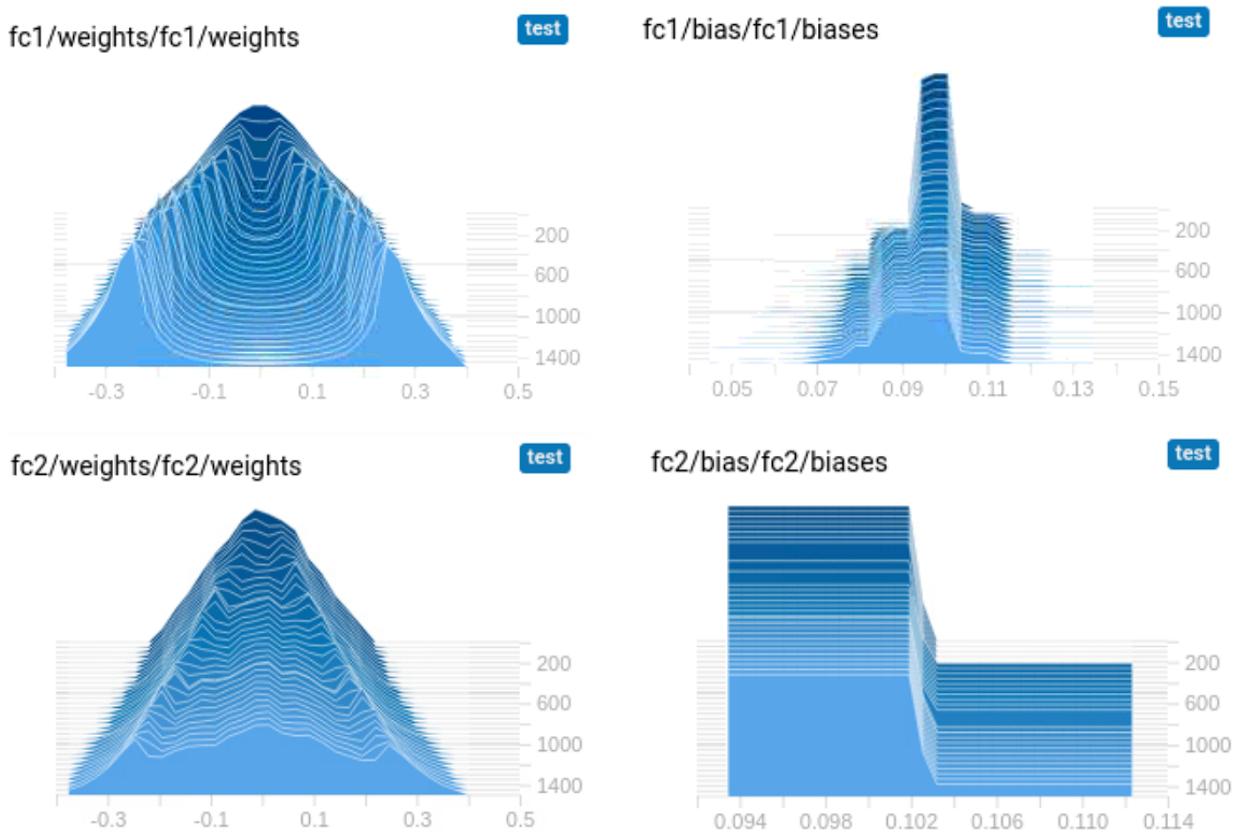
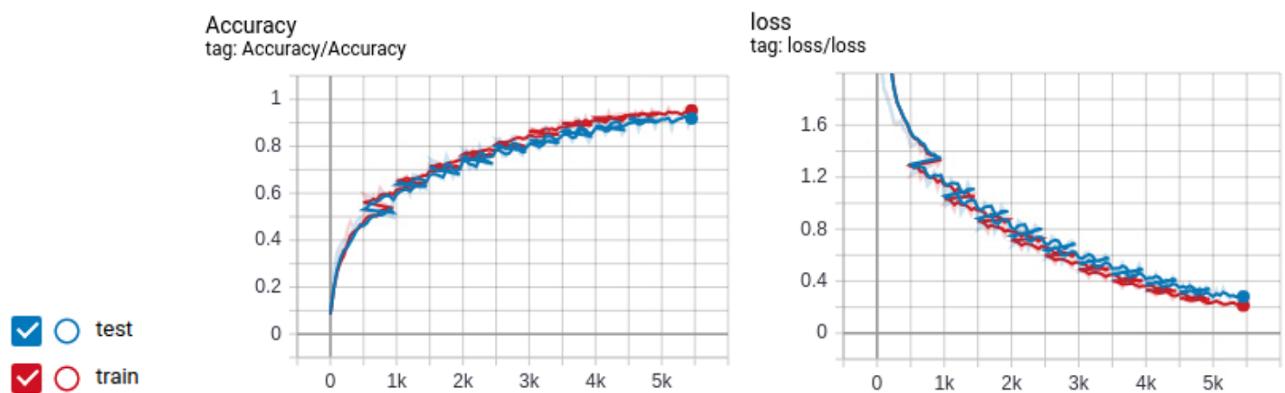


Fig. 5: Training accuracy, learning curve, and histograms of layers

It made the whole weights including conv1, conv2, fc1, fc2 decrease, due to the penalty of the weights.

2. Preprocessing Before Using Convolutional Neural Network for Image Recognition

a.



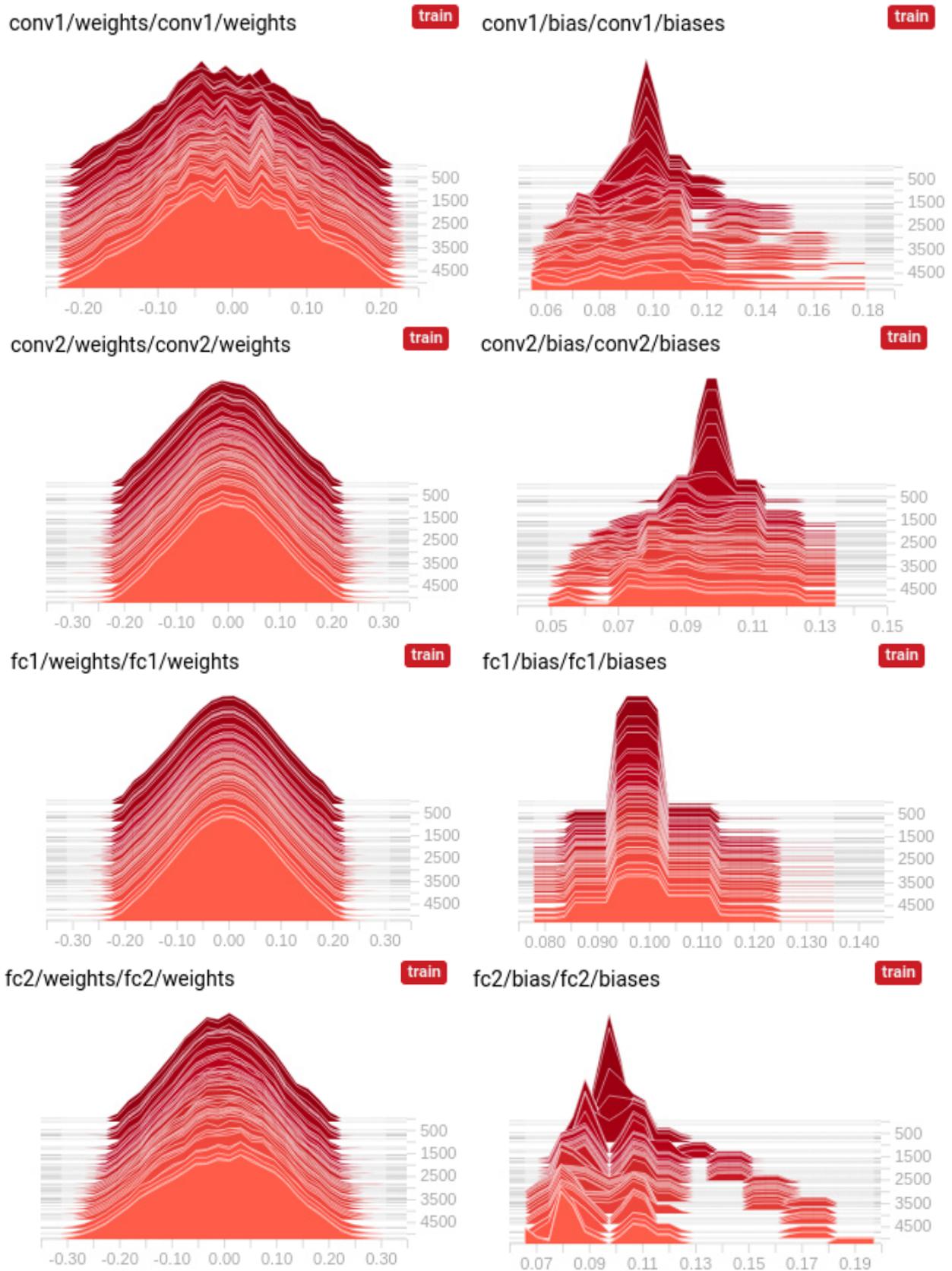


Fig. 6: Training accuracy, learning curve, and histograms of

layers

b.

Input_images/image/2
step 5,450
Wed Dec 09 2020 11:41:25 GMT+0800 (Taipei Standard Time)

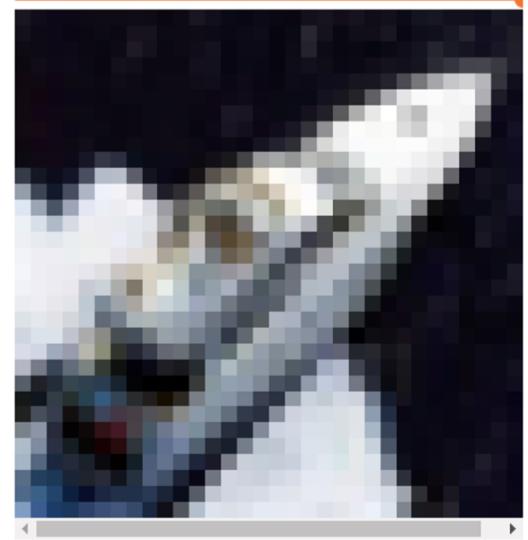
test



pred: deer, label: airplane

Input_images/image/0
step 5,450
Wed Dec 09 2020 11:41:24 GMT+0800 (Taipei Standard Time)

train

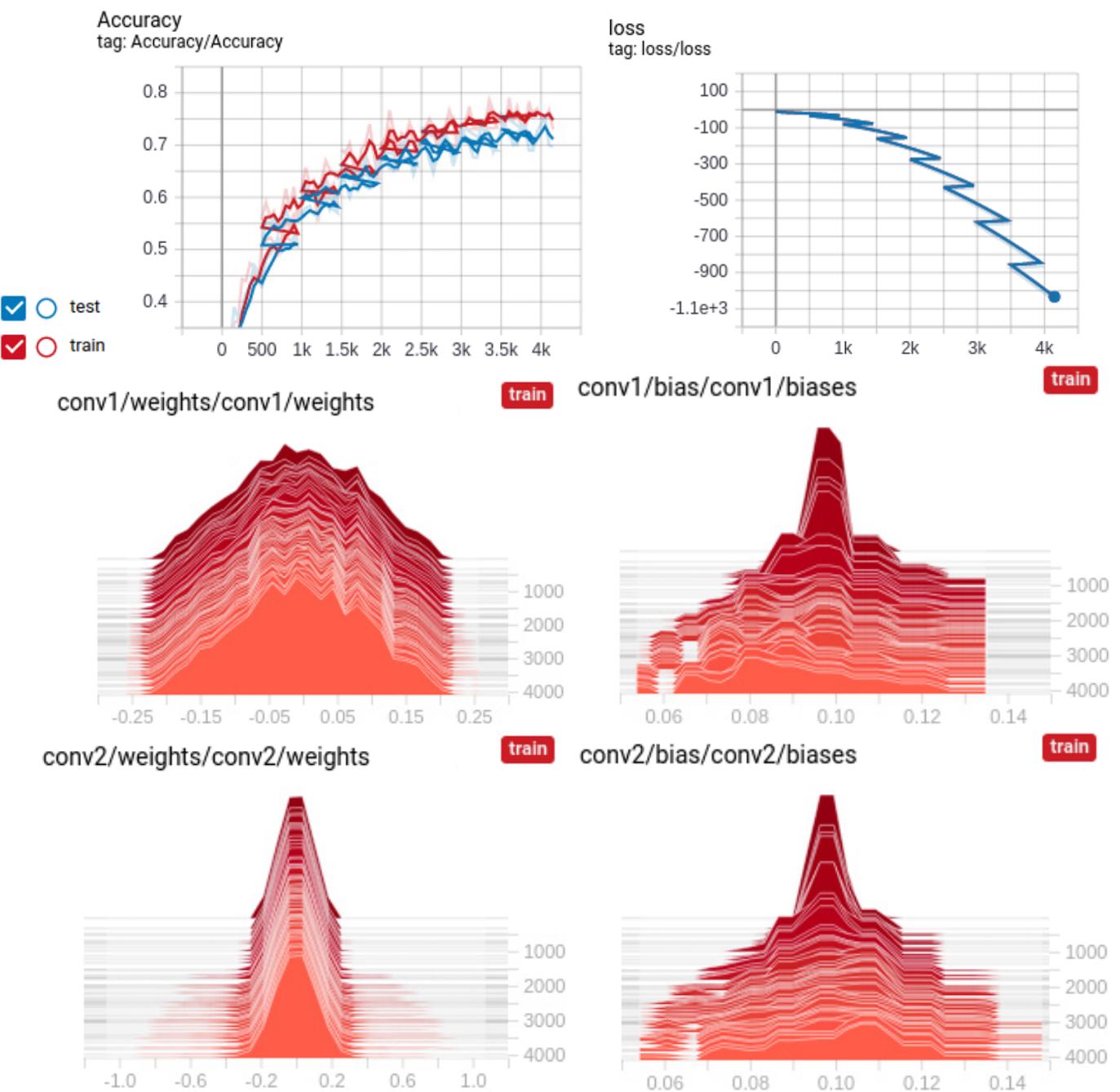


pred: ship, label: ship

Fig. 7: Examples of correctly classified and miss-images

- c. The feature maps from different convolutional layers can't be visualized, due to the color channel(3) is mixed after entering the first convolutional layer.

d.



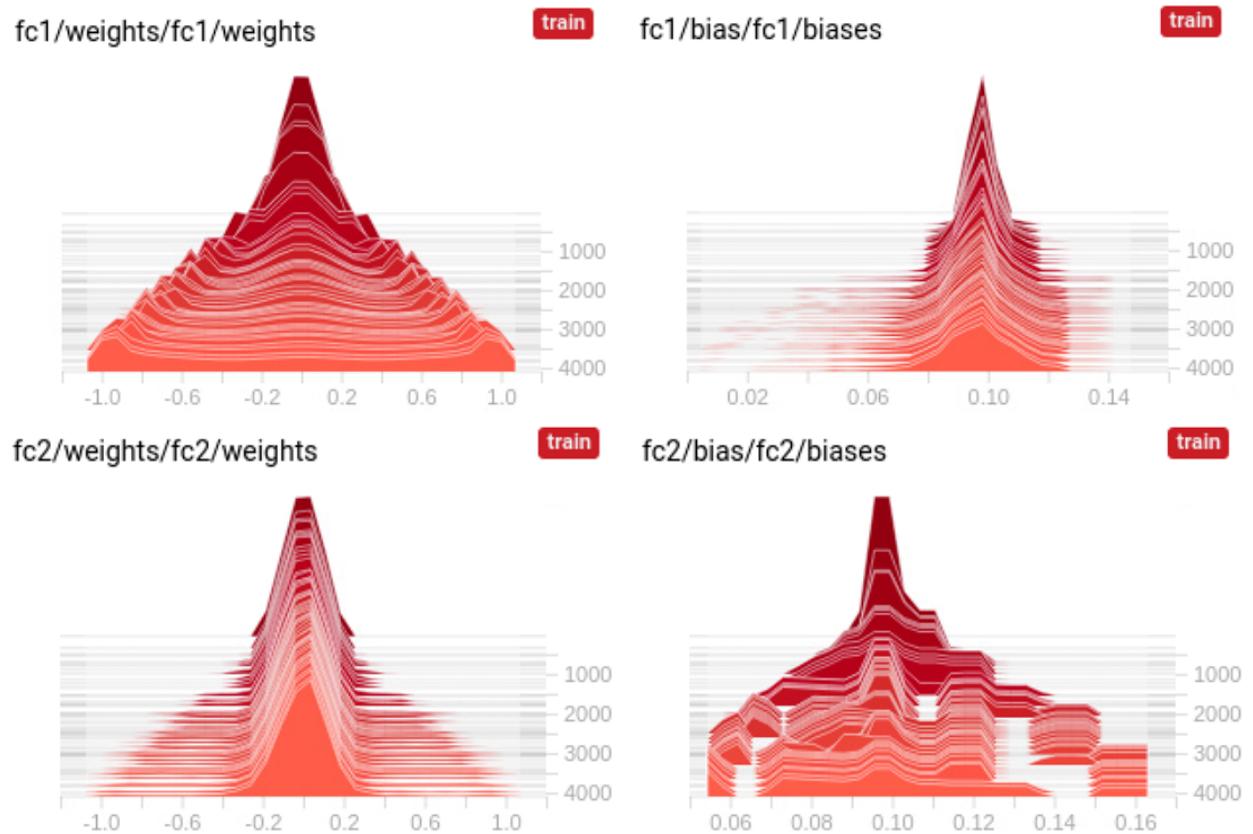


Fig. 8: Training accuracy, learning curve, and histograms of layers

Same as the answer in first problem, it made the whole weights including conv1, conv2, fc1, fc2 decrease, due to the penalty of the weights.

- e. I'd changed the input tensor size into [N samples, 32, 32, 3]