Assignment 1 CNN for image recognition

1. Dataset download

2. Create your own ResNet work shown in Table 1

2.2 Create this model in Table 1

The network structure can be drawn by the tools of tensorboardX, seen as Pic 2.2 and Pic 2.3.

2.5 Report the final accuracy (10,000 steps) of training and testing for the CIFAR-10 dataset

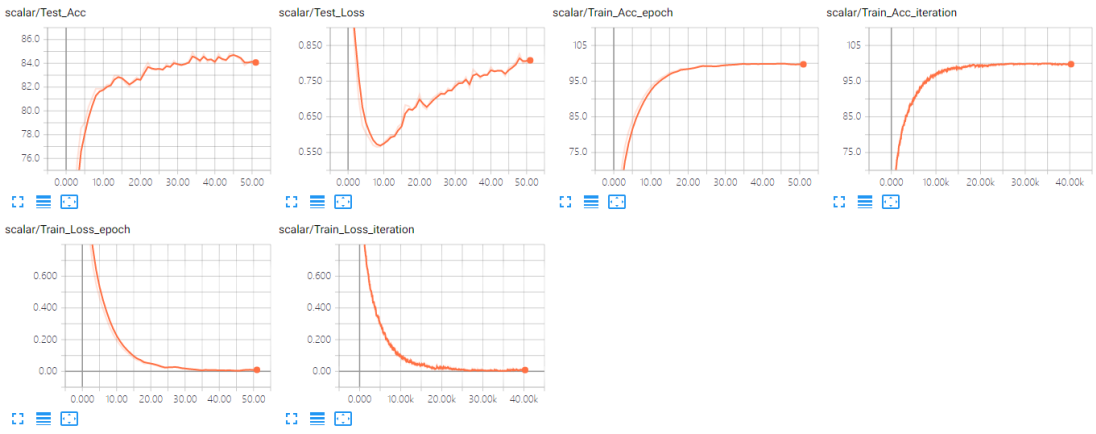
The batch size is set to 64, so we have 652 iterations per epoch. 10000 steps mean that we train our model for 16 epochs. We get a training accuracy of 97.986%, and a testing accuracy of 82.280%.

```
[ 16] train loss: 0.065
[ 16] train auc: 97.986
[ 16] test loss: 0.702
[ 16] test auc: 82.280
```

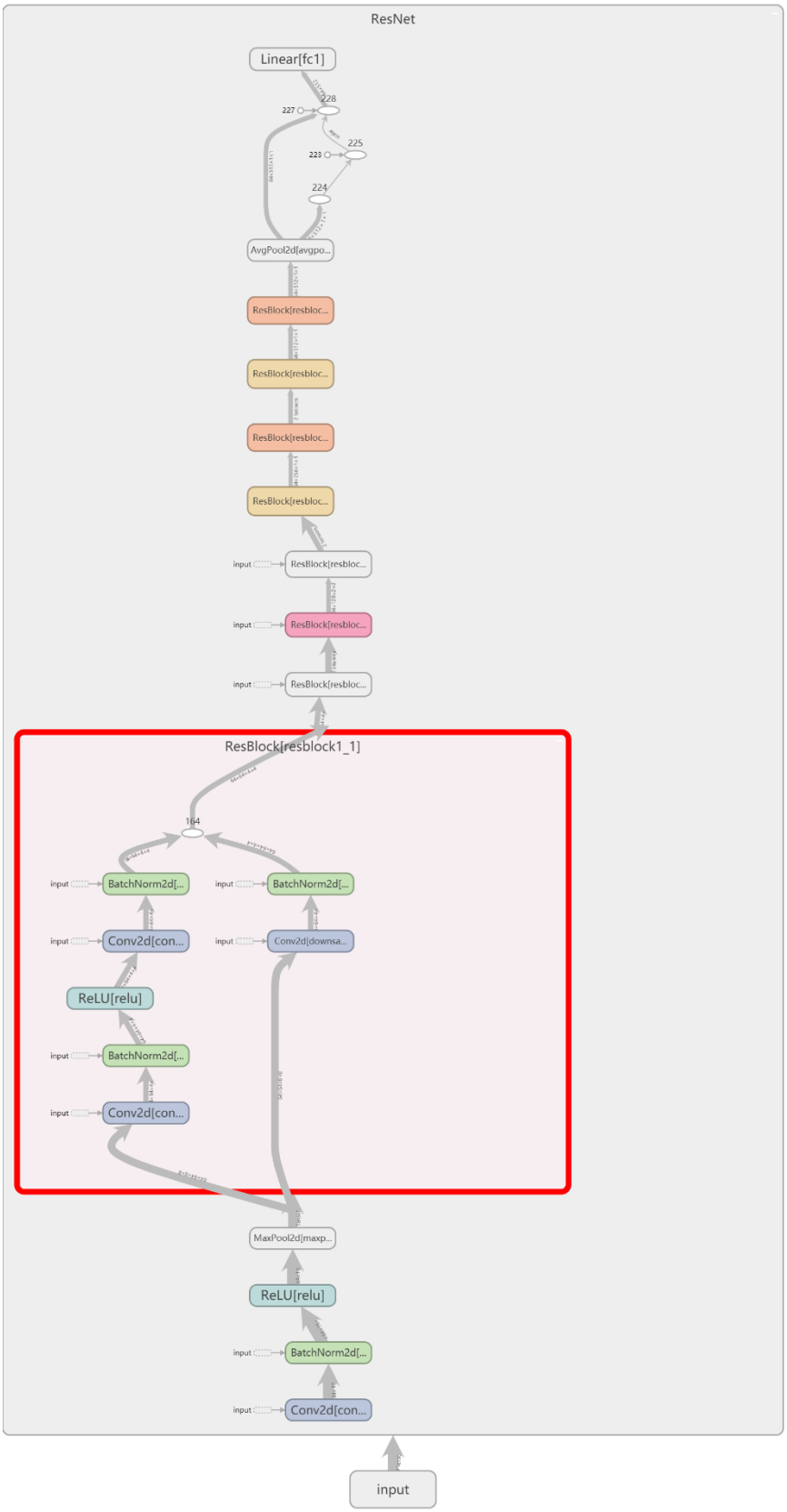
Pic 2.5 Accuracy after 10000 iterations

2.6 Visualize the learning progress (e.g., tensorboardX in Pytorch). Please take a picture for the visualized curves in tensorboardX or visdom in Pytorch then paste them here

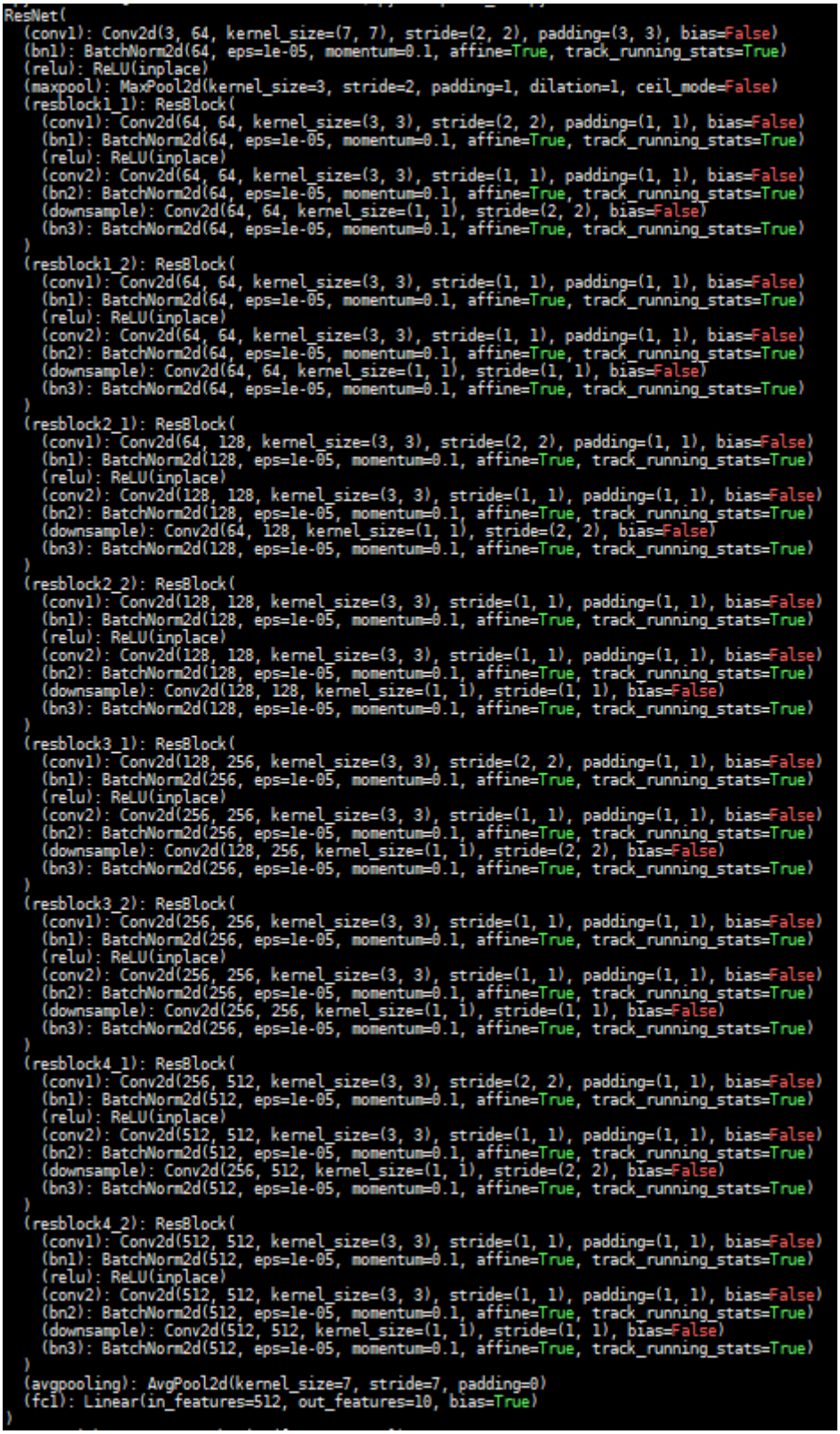
The learning progress has been visualized by tensorboardX, seen as Pic 2.6. We draw the visualized curves of training loss, training accuracy both by iterations and epochs. Meanwhile, we draw the visualized curves of testing loss, testing accuracy by epochs.



Pic 2.6 Learning progress visualization

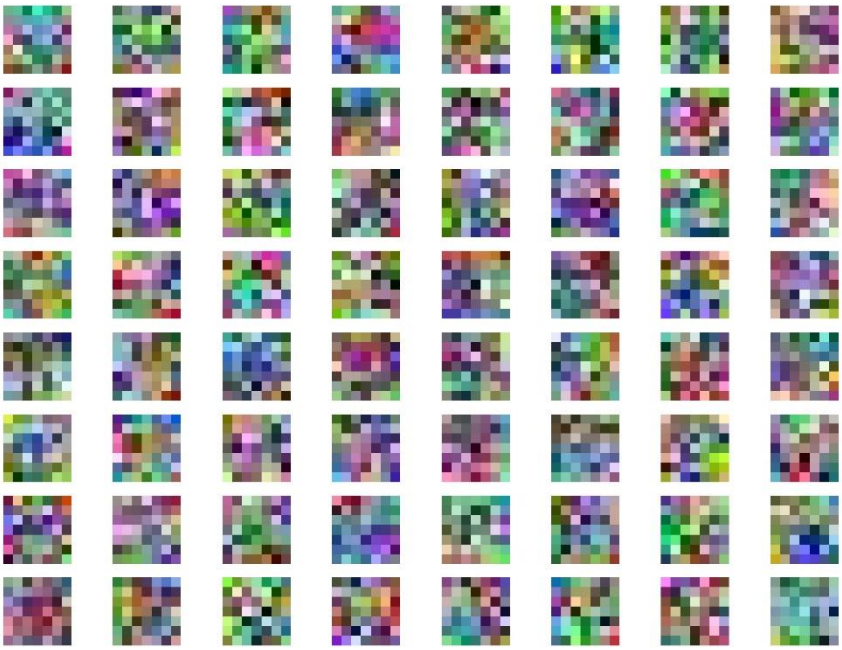


Pic 2.2 network structure of my own ResNet



Pic 2.3 network structure of my own ResNet

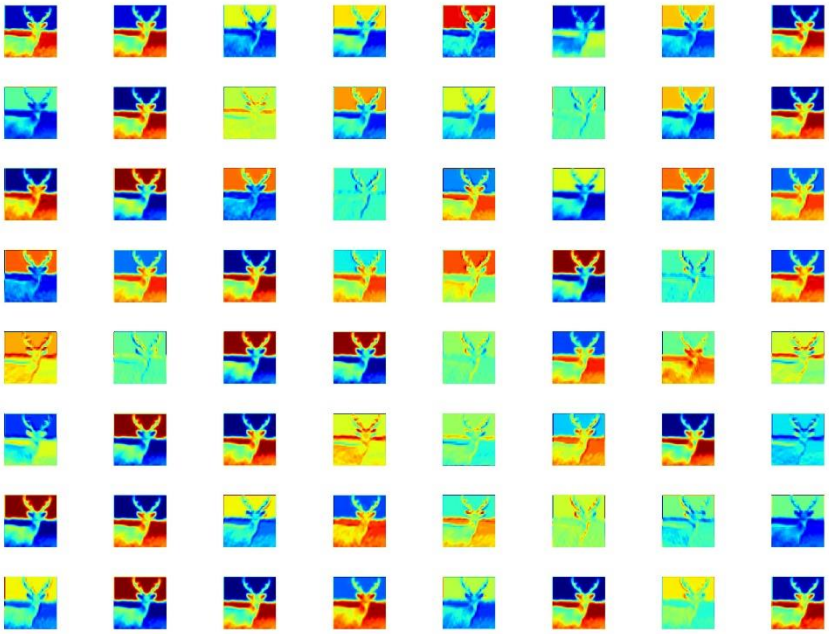
2.7 Filter visualization: Visualization the 64 filters in the layer 'Conv1' after retraining the whole model by 10,000 steps



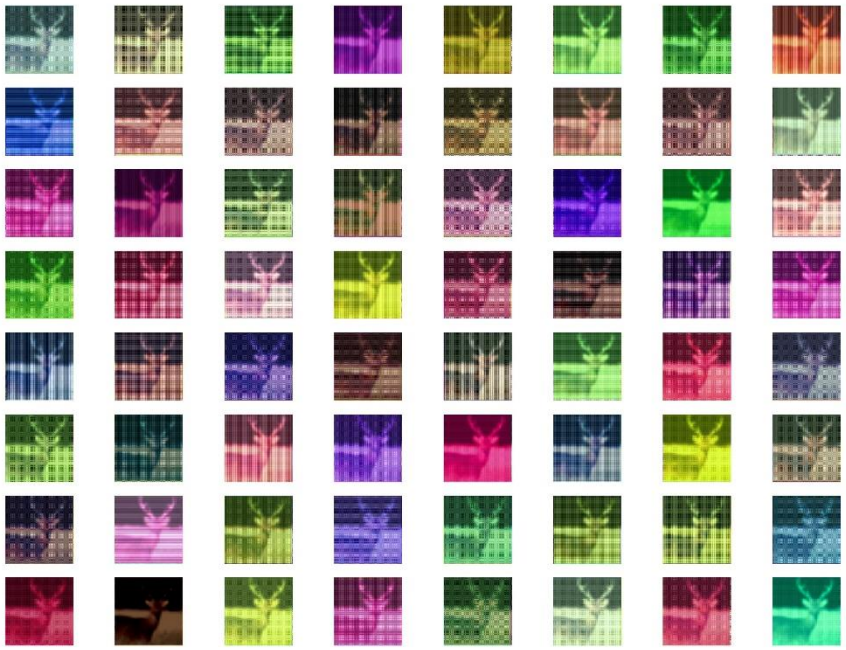
Pic 2.7 Visualization the 64 filters in the layer 'Conv1' after 10000 iterations

2.8 Feature mapping visualization

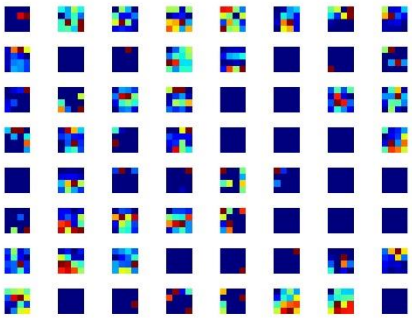
Pic 2.8.1 Example picture

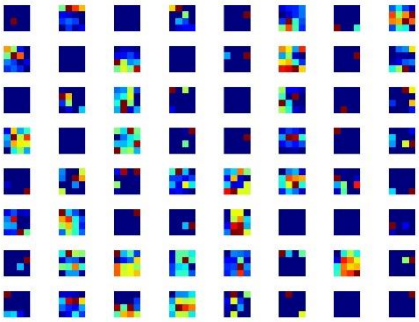


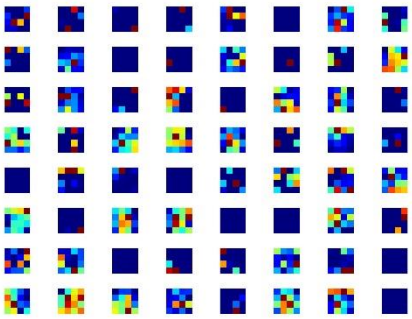
Pic 2.8.2 Visualize the feature maps of the layer 'Conv1'

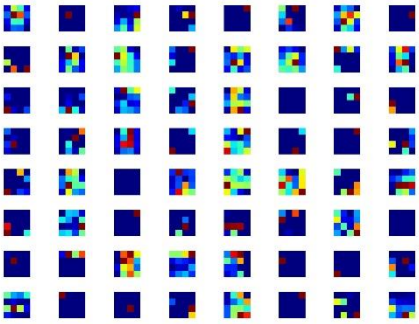


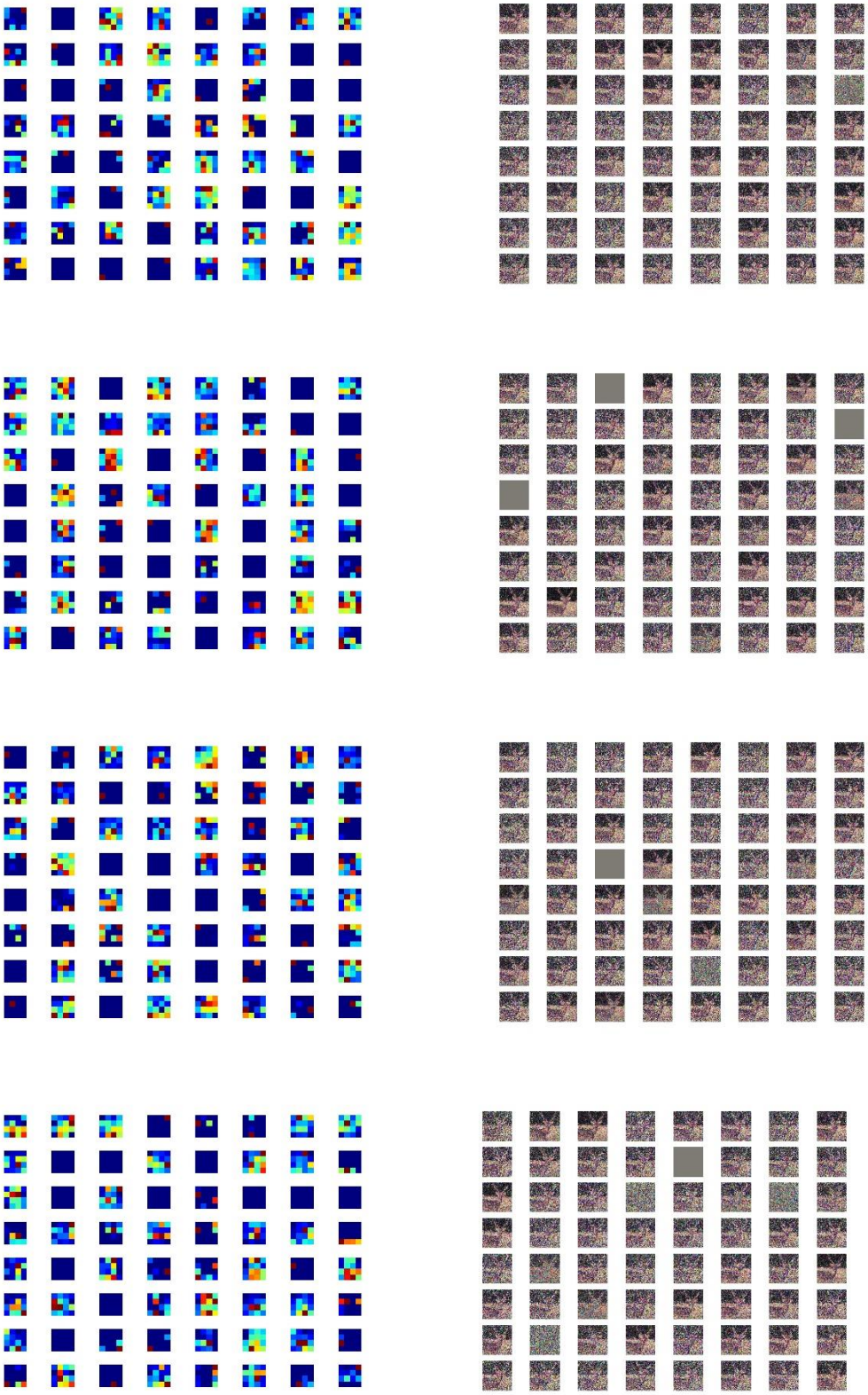
Pic 2.8.3 the reconstructed patterns that cause high activations in feature maps of the layer 'Conv1'











Pic 2.8.4 Visualize the feature maps of the block 'Conv5_x'(Left), the reconstructed patterns that cause high activations in feature maps of the block 'Conv5_x'(Right)

3. Feedback

3.1 Time your spend for this assignment, i.e., how many hours?

Nearly 30 hours.

3.2 Comments for this course?

The course is not as helpful as I think before I attend it, mainly because the course content is unreasonable.

3.3 Comments for this assignment?

This assignment is challenging and useful for me to learn AI. I learn lots of knowledge about CNNs by myself during the assignment.

3.4 Suggestion for the following lectures?

More about classic or state-of-art algorithms.