

Assignment 1 CNN for image recognition

朱鸿锦

1901213166

1 Dataset

I download the required dataset, and use dataloader in torch to load the data

```
cifar10_test = torchvision.datasets.CIFAR10(root='./data', train=False, download=True, transform=transform_test)
cifar10_test_loader = DataLoader(
    cifar10_test, shuffle=shuffle, batch_size=batch_size)
```

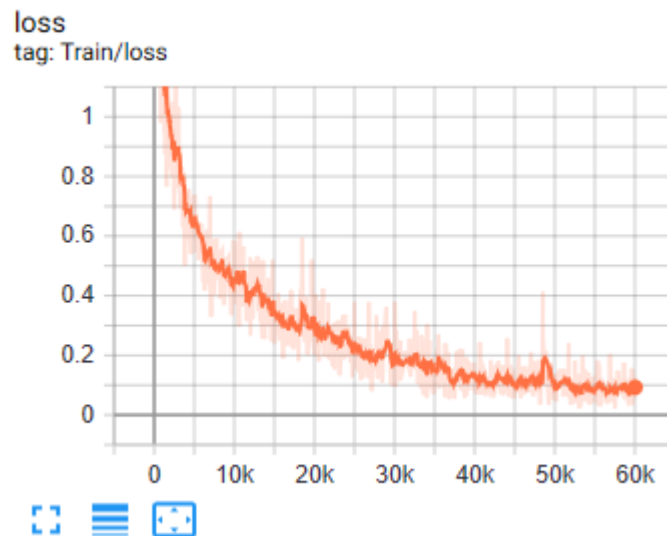
2 Create the ResNet

Optimizer: Adam lr = 0.001(by default)

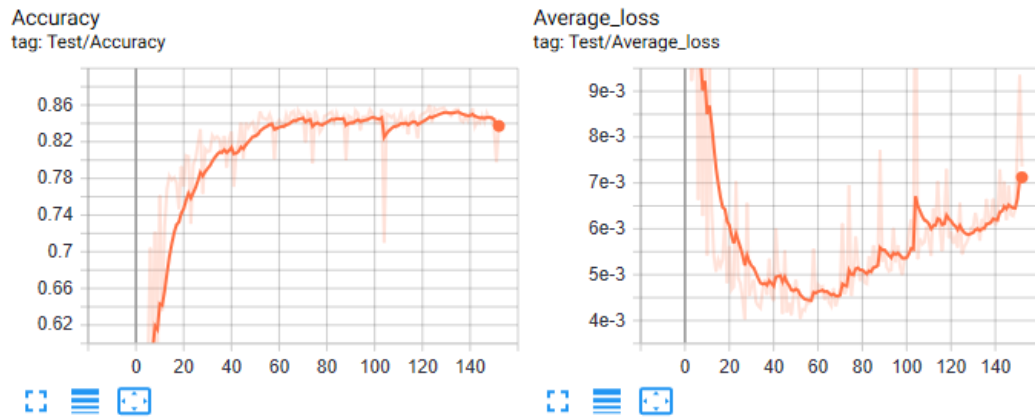
Batch_size=128

Epochs = 140

Training result:



Validation:



Test result:

```
Top 1 err: tensor(0.1396, device='cuda:0')
Top 5 err: tensor(0.0081, device='cuda:0')
```

Note: I train the net overfit, but after 60 epochs, I save the best result not the last.

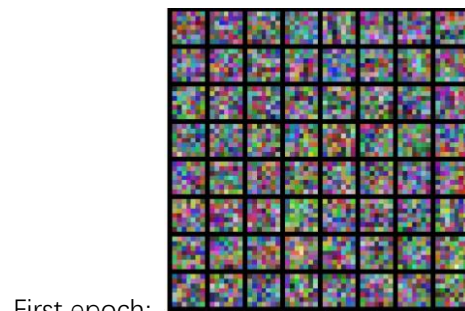
```
best_acc = 0.0 #到了一定次数之后记录最好结果而不是最后结果
for epoch in range(1,200):
    train(epoch)
    acc = eval_training(epoch)

    if epoch > 60 and best_acc < acc:
        torch.save(net.state_dict(), checkpoint_path.format(epoch = epoch, type = 'best'))
        best_acc = acc
        continue

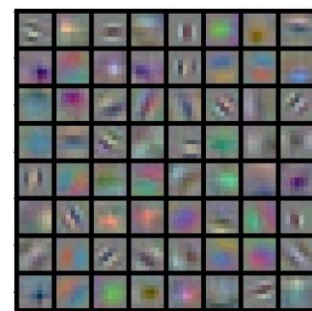
    if not epoch % 20:
        torch.save(net.state_dict(), checkpoint_path.format(epoch=epoch, type='regular'))
```

3 Filter visualization

Conv1 Kernel_size=7*7, stride = 2



First epoch:



best epoch

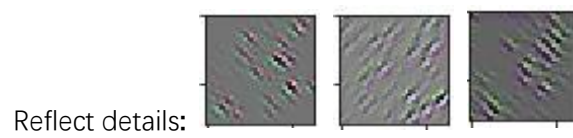
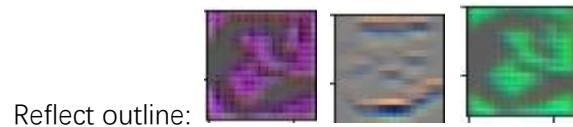
I compare the kernel in the first epoch and the best epoch, we can point out that after training, the filters can extract some special structure rather than just some random numbers(first epoch).

4 Feature mapping visualization

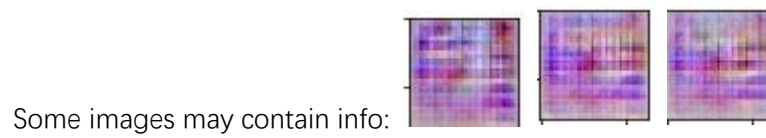
Original image:



Reconstruct from conv1:



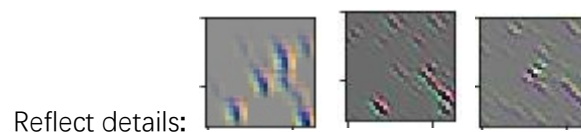
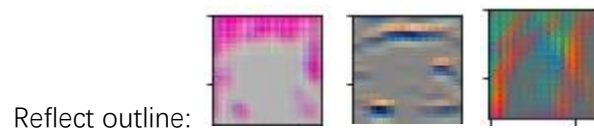
Reconstruct from conv5



Original image:



Reconstruct from conv1:

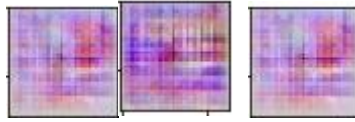


Reconstruct from conv5

Information lose:



Some images may contain info:



5 Feedback

- More than 24h
- First: I do think we need a clear concise instructions about the course. Sharing the research exp is good but I do think it dose not mean no major line in class
Second: if you want to introduce one thing to us, just talk about it in detail, do not omit any details.
Third: the reason why we do not want to answer the question in class is most of your questions are really boring like: can you understand? Do you know? Of course everyone know CNN, but most of us do not know all the details. You can just tell your lecture, if something is really important, you can repeat it and ask for our attention.
- I think coding line by line and debug them are very helpful for our feature research. But the questions are really bad. 32*32pic need to be processed into 1*1 and reconstructed? Besides, I think your ref code dose not suit for our task, please pay more attentions on the ref code. What is more, there are better way to visualization the net, for example: <https://research.googleblog.com/2015/06/inceptionism-going-deeper-into-neural.html> i think you should chose the best one for us to follow
- For the following lectures: first, we need answer and expand for this assignment. Second, more detail less chicken soup. Then I you really want chance AI into Deep learning, tell some things more basic and classic

6 References:

<https://github.com/weiaicunzai/pytorch-cifar100>