第九讲 机器视觉3 作业

724602210635 黄奕中

1. 代码补全：

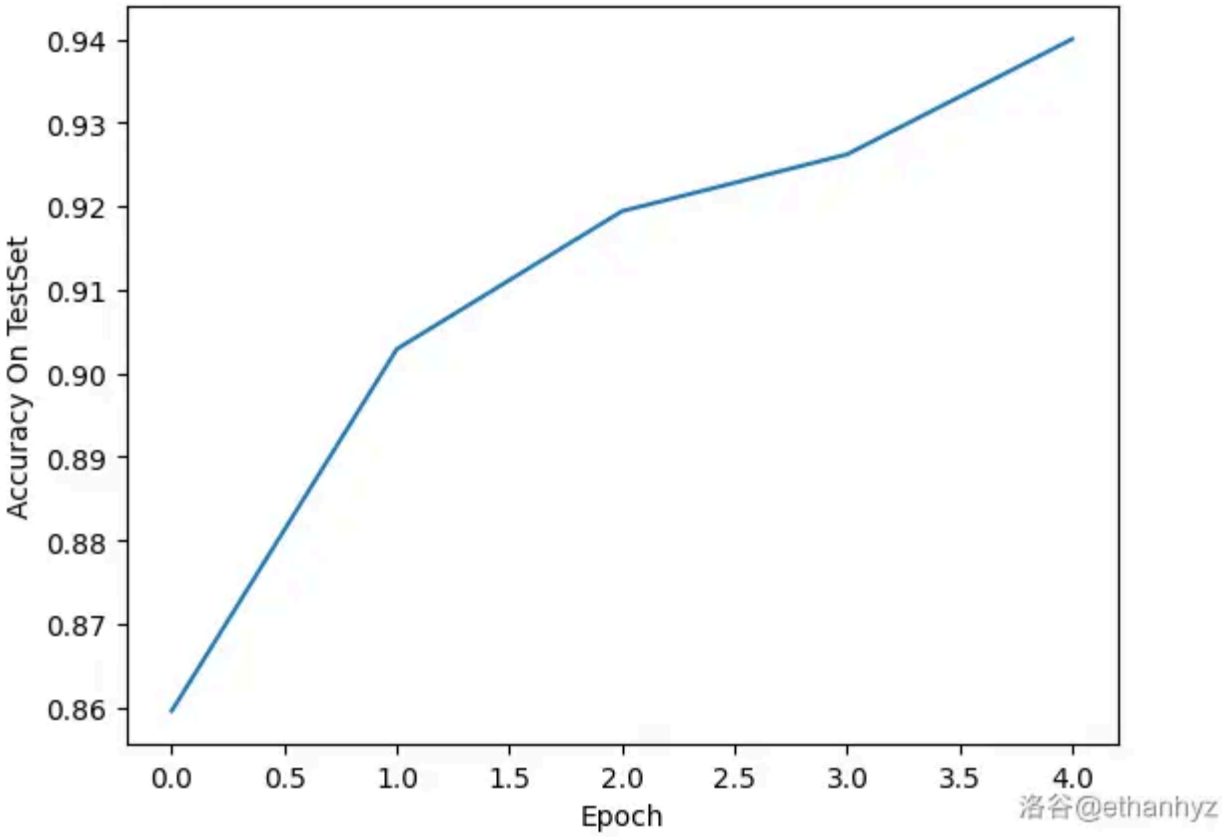
```
line 056 : x = x.view(batch_size, -1)

line 084 : running_correct += (predicted == target).sum().item()

line 103 : correct += (predicted == labels).sum().item()
```

隐藏层维度分别为 $[\text{batch\_size}, 10, 12, 12]$ 和 $[\text{batch\_size}, 20, 4, 4]$

输出层维度为 $[\text{batch\_size}, 10]$

运行结果：

```
| Epoch 1 | batch   300 / 938 | loss: 2.198 | acc: 27.47 % |
| Epoch 1 | batch   600 / 938 | loss: 1.556 | acc: 67.04 % |
| Epoch 1 | batch   900 / 938 | loss: 0.722 | acc: 81.51 % |
| Epoch 1 / 5 | Accuracy on test set: 86.0 % |
| Epoch 2 | batch   300 / 938 | loss: 0.483 | acc: 86.11 % |
| Epoch 2 | batch   600 / 938 | loss: 0.414 | acc: 87.85 % |
| Epoch 2 | batch   900 / 938 | loss: 0.380 | acc: 88.72 % |
| Epoch 2 / 5 | Accuracy on test set: 90.3 % |
| Epoch 3 | batch   300 / 938 | loss: 0.340 | acc: 89.89 % |
| Epoch 3 | batch   600 / 938 | loss: 0.327 | acc: 90.13 % |
| Epoch 3 | batch   900 / 938 | loss: 0.307 | acc: 90.62 % |
| Epoch 3 / 5 | Accuracy on test set: 91.9 % |
| Epoch 4 | batch   300 / 938 | loss: 0.292 | acc: 91.41 % |
| Epoch 4 | batch   600 / 938 | loss: 0.264 | acc: 92.02 % |
| Epoch 4 | batch   900 / 938 | loss: 0.270 | acc: 91.99 % |
| Epoch 4 / 5 | Accuracy on test set: 92.6 % |
| Epoch 5 | batch   300 / 938 | loss: 0.245 | acc: 92.40 % |
| Epoch 5 | batch   600 / 938 | loss: 0.242 | acc: 92.72 % |
| Epoch 5 | batch   900 / 938 | loss: 0.223 | acc: 93.40 % |
| Epoch 5 / 5 | Accuracy on test set: 94.0 % |
```



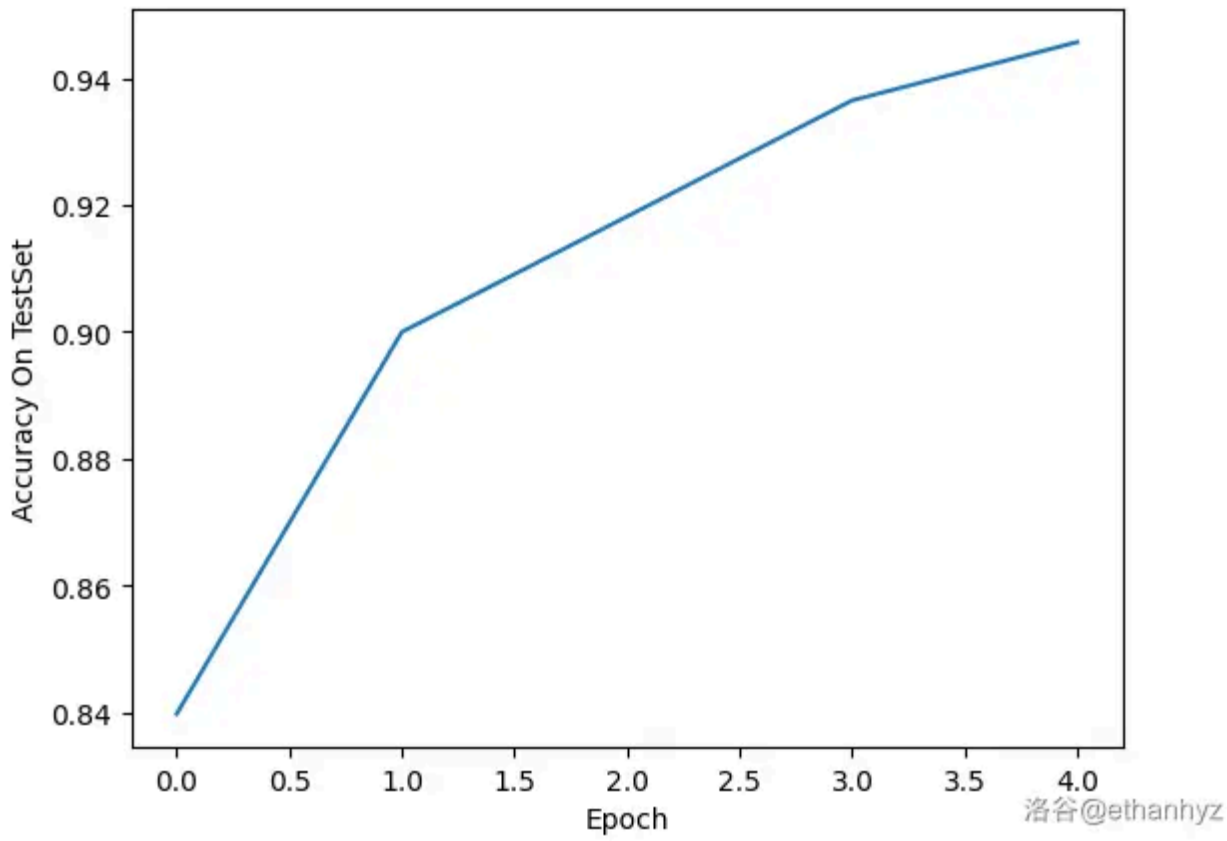
2. 修改网络结构：

修改如下两句：

```
line 37 : torch.nn.Conv2d(1, 10, kernel_size=9),

line 42 : torch.nn.Conv2d(10, 20, kernel_size=3),
```

运行结果：

```
| Epoch 1 | batch   300 / 938 | loss: 2.237 | acc: 28.21 % |
| Epoch 1 | batch   600 / 938 | loss: 1.883 | acc: 65.42 % |
| Epoch 1 | batch   900 / 938 | loss: 0.959 | acc: 79.56 % |
| Epoch 1 / 5 | Accuracy on test set: 84.0 % |
| Epoch 2 | batch   300 / 938 | loss: 0.526 | acc: 85.60 % |
| Epoch 2 | batch   600 / 938 | loss: 0.446 | acc: 87.21 % |
| Epoch 2 | batch   900 / 938 | loss: 0.385 | acc: 88.51 % |
| Epoch 2 / 5 | Accuracy on test set: 90.0 % |
| Epoch 3 | batch   300 / 938 | loss: 0.349 | acc: 89.78 % |
| Epoch 3 | batch   600 / 938 | loss: 0.325 | acc: 90.44 % |
| Epoch 3 | batch   900 / 938 | loss: 0.292 | acc: 91.27 % |
| Epoch 3 / 5 | Accuracy on test set: 91.8 % |
| Epoch 4 | batch   300 / 938 | loss: 0.281 | acc: 91.64 % |
| Epoch 4 | batch   600 / 938 | loss: 0.264 | acc: 92.35 % |
| Epoch 4 | batch   900 / 938 | loss: 0.236 | acc: 92.96 % |
| Epoch 4 / 5 | Accuracy on test set: 93.7 % |
| Epoch 5 | batch   300 / 938 | loss: 0.231 | acc: 93.12 % |
| Epoch 5 | batch   600 / 938 | loss: 0.208 | acc: 93.88 % |
| Epoch 5 | batch   900 / 938 | loss: 0.209 | acc: 93.91 % |
| Epoch 5 / 5 | Accuracy on test set: 94.6 % |
```



3. 调参：

`batch_size`：每轮训练的数据量为

$$\frac{\text{数据集总大小} = 60000}{\text{batch\_size}}$$

例如，当 $\text{batch\_size} = 64$ 时，每批次的训练样本数为：

$$\lfloor \frac{60000}{64} \rfloor = 937$$

`learning_rate`：字面意思，学习速率，值越大，准确率提升越快；值越小，准确率较低。但此值大小对训练速度并无比较大的影响

`EPOCH`：训练迭代轮数