

人工智能中的编程 Final Task1

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1 Introduction

Task1 使用 Pytorch 搭建了简单的 CNN 网络用于完成 MNIST 数据集的分类任务。

2 Implementation

使用 HW1.1 中的框架，进行小幅度参数修改和训练集改正后即可使用，具体框架为一个含有两个卷积层和池化层及三个线性层的 CNN 网络。

运行代码，会在训练集上进行 10 个 Epoch 的训练并在进度条中报告训练过程。训练完成后，保存模型参数到 models 文件夹，并在测试集上对网络进行测试。反馈各 Epoch 训练结果下的 loss 变化曲线，及针对全体和各类别的分类准确率情况直方图，图片保存在 results 文件夹。

运行过程截图见下图1

```
(code_in_ai) E:\PKU\code_in_ai\homework\Final\Task1>python mnist.py
Start Training
Epoch: 1/10: 100% | 3750/3750 [00:10:00:00, 343.23batch/s, loss=0.200]
Epoch: 2/10: 100% | 3750/3750 [00:10:00:00, 350.78batch/s, loss=0.111]
Epoch: 3/10: 100% | 3750/3750 [00:11:00:00, 334.52batch/s, loss=0.081]
Epoch: 4/10: 100% | 3750/3750 [00:11:00:00, 336.31batch/s, loss=0.074]
Epoch: 5/10: 100% | 3750/3750 [00:11:00:00, 339.84batch/s, loss=0.060]
Epoch: 6/10: 100% | 3750/3750 [00:11:00:00, 334.25batch/s, loss=0.049]
Epoch: 7/10: 100% | 3750/3750 [00:10:00:00, 344.32batch/s, loss=0.046]
Epoch: 8/10: 100% | 3750/3750 [00:10:00:00, 343.18batch/s, loss=0.043]
Epoch: 9/10: 100% | 3750/3750 [00:11:00:00, 338.25batch/s, loss=0.047]
Epoch: 10/10: 100% | 3750/3750 [00:11:00:00, 335.46batch/s, loss=0.034]
Accuracy of the total: 98.30%
Accuracy of 0: 99.00%
Accuracy of 1: 99.00%
Accuracy of 2: 97.00%
Accuracy of 3: 99.00%
Accuracy of 4: 99.00%
Accuracy of 5: 97.00%
Accuracy of 6: 99.00%
Accuracy of 7: 98.00%
Accuracy of 8: 98.00%
Accuracy of 9: 98.00%
Finished Training
```

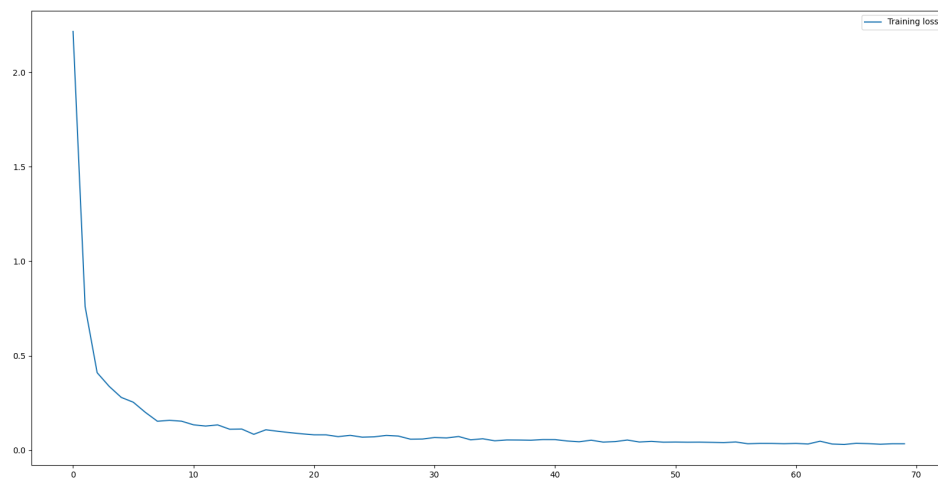
Figure 1: Process of training and test

在 Task1 文件夹下，打开命令行，运行命令 `python mnist.py` 即可。

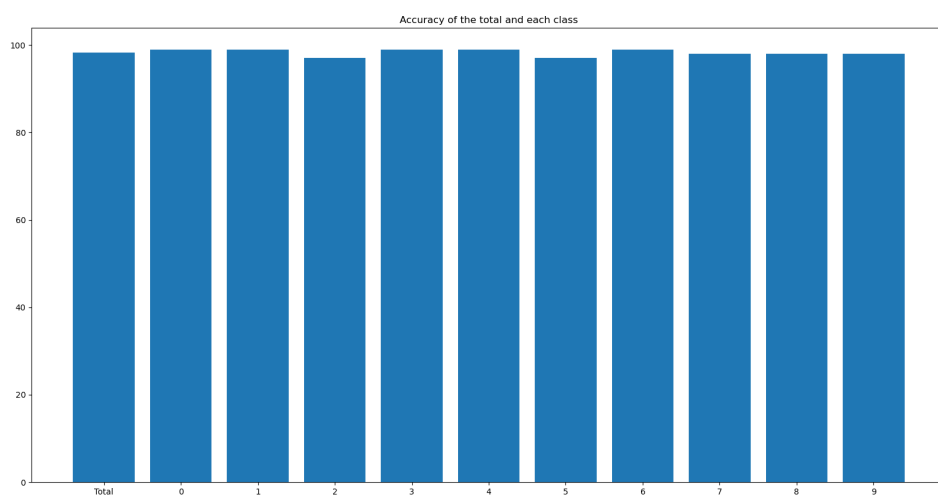
3 Results

使用 SGD 优化器和 CrossEntropyLoss 损失函数，学习率为 0.003，Momentum 为 0.6，训练 10 个 Epoch 后可达到 98.30% 的准确率，结果见下图2

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(a) Loss 曲线



(b) Accuracy

Figure 2: Results