Homework 3

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Implementation

I use **Pytorch** to implement the model.

I use the same way as HW1 to load the data(require **pickle**).

The structure of my model:

```
model = torch.nn.Sequential(
    torch.nn.Linear(784, 200),
    torch.nn.ReLU(),
    torch.nn.Linear(200, 50),
    torch.nn.ReLU(),
    torch.nn.Linear(50, 10),
    torch.nn.Softmax(dim=1)
)
loss_fn = torch.nn.CrossEntropyLoss()
```

The hyperparameters:

```
leanring_rate = 0.02
epochs = 10
batch_size = 128
```

I use mini-batch SGD for the training, and I use a GPU(GeForce RTX 2080) to speedup .

Result

One time:

```
epoch:  1, training accuracy: 66.86 %
epoch:  2, training accuracy: 77.43 %
epoch:  3, training accuracy: 86.50 %
epoch:  4, training accuracy: 87.63 %
epoch:  5, training accuracy: 88.20 %
epoch:  6, training accuracy: 92.74 %
epoch:  7, training accuracy: 96.55 %
epoch:  8, training accuracy: 97.13 %
epoch:  9, training accuracy: 97.42 %
epoch: 10, training accuracy: 97.83 %
testing accuracy: 96.65 %, runtime: 34.9 s
```

Five times performance:

#	1	2	3	4	5	Average
Accuracy(%)	96.43	88.00	97.24	96.91	96.65	95.05
runtime(s)	34.7	35.3	35.2	35.8	34.9	35.2