EE5053 Hw2

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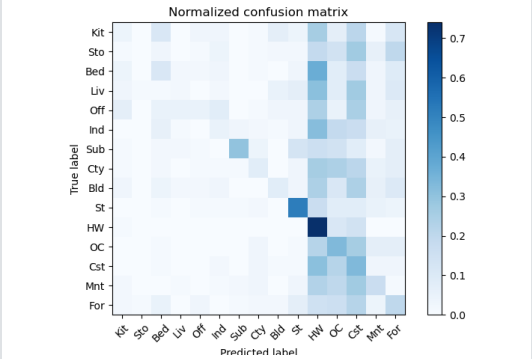
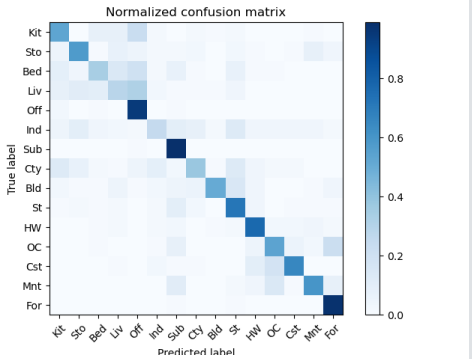
Part 1

- Accuracy
  - Tiny Image: 0.20133333333333334
  - Bag of Sift: 0.606
- Confusion Matrix
Tiny Image	Bag of Sift
	
  - Bag of Sift 的表現明顯較佳，他比起Tiny Image更能找出合理的feature。Tiny Image在High Way預設的表現是最好的，推測是因為圖片下方大多是大面積的灰色公路，在縮小後還能保有特徵，也因此很多其他種類的圖片都錯誤的被分到High Way。而Bag of Sift在Industrial的表現較差，推測試因為圖片中的工廠有許多外型，很難像Forest之類的類別的找出類似的特徵。

Part 2

- Architectures and Parameters
  - ConvNet

```
ConvNet(
  (cnn): Sequential(
    (0): Conv2d(1, 6, kernel_size=(5, 5), stride=(1, 1))
    (1): ReLU()
```

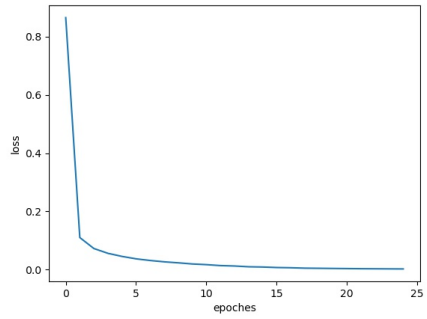
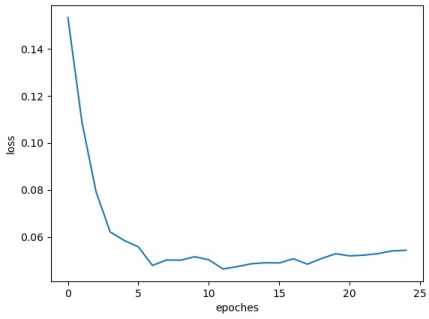
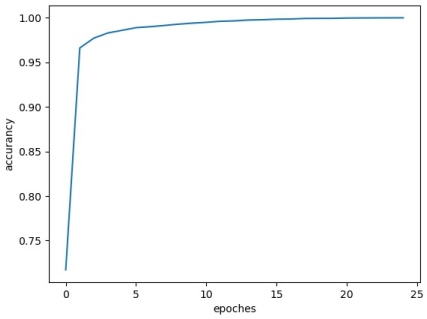
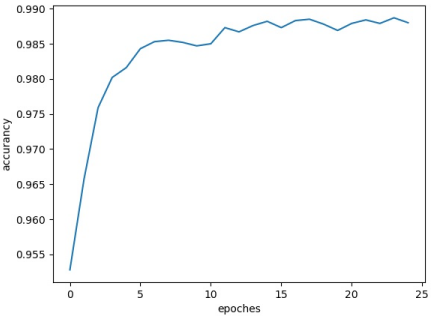
```
    (2): MaxPool2d(kernel_size=2, stride=2, padding=0,
dilation=1, ceil_mode=False)
    (3): Conv2d(6, 16, kernel_size=(5, 5), stride=(1, 1))
    (4): ReLU()
    (5): MaxPool2d(kernel_size=2, stride=2, padding=0,
dilation=1, ceil_mode=False)
  )
  (linear): Sequential(
    (0): Linear(in_features=256, out_features=120,
bias=True)
    (1): ReLU()
    (2): Linear(in_features=120, out_features=84,
bias=True)
    (3): ReLU()
    (4): Linear(in_features=84, out_features=10,
bias=True)
    (5): ReLU()
  )
)
# of parameters:  44426
```

- MyNet

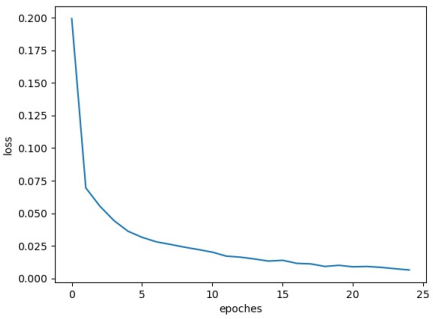
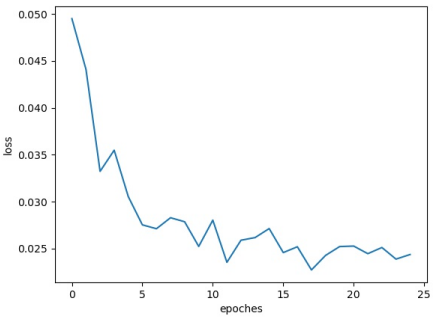
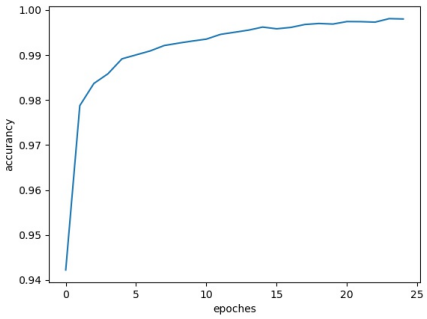
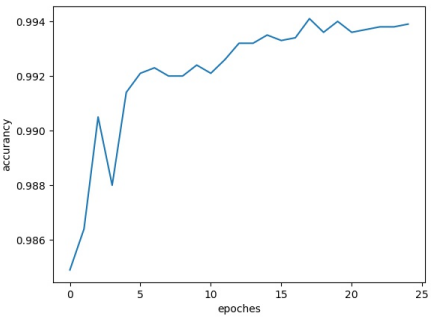
```
MyNet(
  (cnn): Sequential(
    (0): Conv2d(1, 32, kernel_size=(3, 3), stride=(1, 1))
    (1): ReLU()
    (2): BatchNorm2d(32, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (3): Conv2d(32, 32, kernel_size=(3, 3), stride=(1, 1))
    (4): ReLU()
    (5): BatchNorm2d(32, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (6): Conv2d(32, 32, kernel_size=(5, 5), stride=(2, 2),
padding=(2, 2))
    (7): ReLU()
    (8): BatchNorm2d(32, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (9): Dropout2d(p=0.4, inplace=False)
    (10): Conv2d(32, 64, kernel_size=(3, 3), stride=(1,
1))
```

```
    (11): ReLU()
    (12): BatchNorm2d(64, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (13): Conv2d(64, 64, kernel_size=(3, 3), stride=(1,
1))
    (14): ReLU()
    (15): BatchNorm2d(64, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (16): Conv2d(64, 64, kernel_size=(5, 5), stride=(2,
2), padding=(2, 2))
    (17): ReLU()
    (18): BatchNorm2d(64, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (19): Dropout2d(p=0.4, inplace=False)
    (20): Conv2d(64, 128, kernel_size=(4, 4), stride=(1,
1))
    (21): ReLU()
    (22): BatchNorm2d(128, eps=1e-05, momentum=0.1,
affine=True, track_running_stats=True)
    (23): Dropout2d(p=0.4, inplace=False)
  )
  (linear): Sequential(
    (0): Linear(in_features=128, out_features=10,
bias=True)
  )
)
# of parameters:  326410
```

- Learning Curve
    - ConvNet

Train	Validation
	
	

- MyNet

Train	Validation
	
	

- Compare
  - ConvNet在validaion set的準確率約為0.988，MyNet約為0.994。這邊ConvNet使用的架構是LeNet 5，我自己在做MyNet時還蠻難超越LeNet的，就算是多加幾層Conv2d也不會好多少。之後參考了

Kaggle上其他人的做法再簡化才生出MyNet。MyNet的參數量約為ConvNet的八倍，因此收斂速度較慢，不過最終的loss也較低。

Reference

https://www.kaggle.com/cdeotte/how-to-choose-cnn-architecture-mnist