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HW1: Image classification

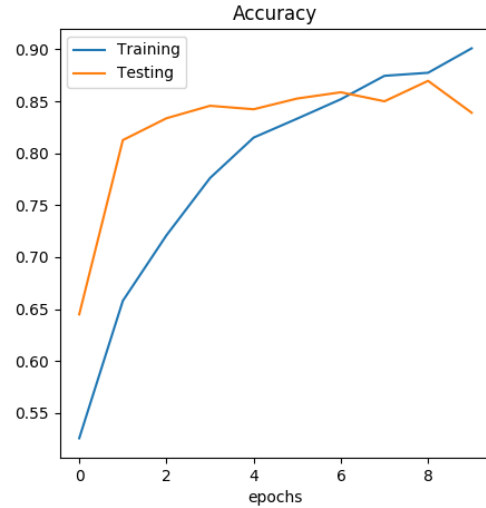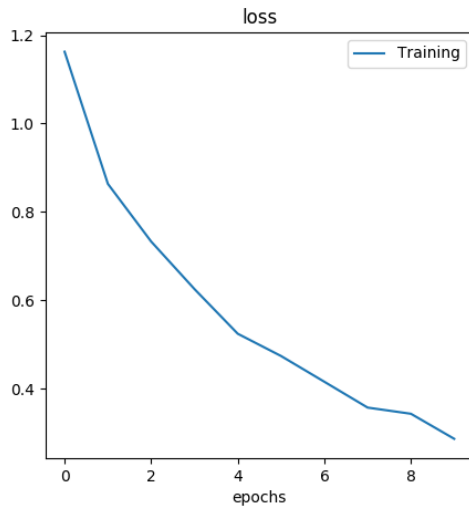1. Describe the models you use, including the parameter selection?

T1: seed = 123, epochs = 10, batch_size = 32, optimizer = 'SGD', lr = 0.01

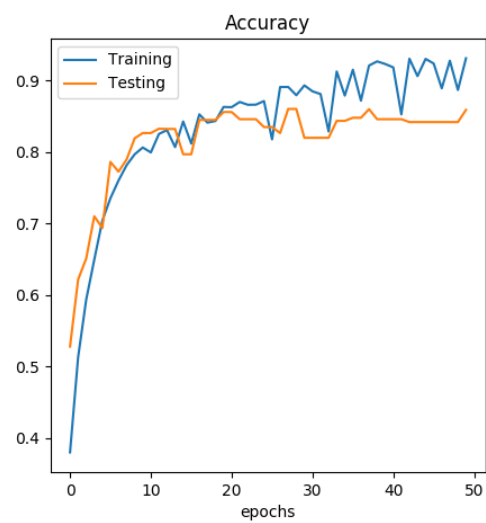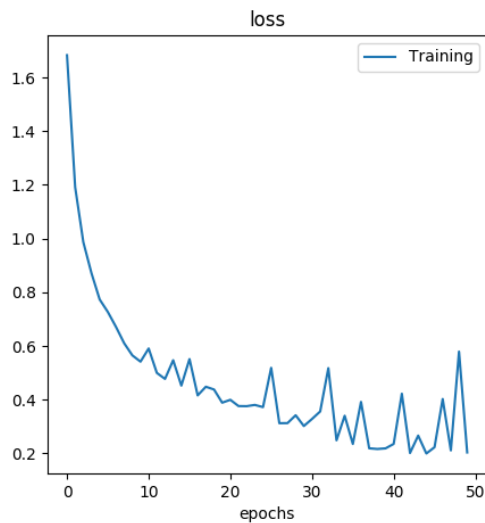T2: seed = 1, epochs = 50, batch_size = 16, optimizer = 'Adam', lr = 0.001

T2 的模型 VGG16 + batch normalization

2. In experiment, plot two figures of accuracy and loss curves and the testing accuracy.

T1:

T2:

T1:

```
Accuracy on the ALL test images: 83 %
Accuracy of   sea : 90 %
Accuracy of forest : 96 %
Accuracy of street : 91 %
Accuracy of mountain : 70 %
Accuracy of glacier : 72 %
Accuracy of buildings : 80 %
```

T2:

```
Accuracy on the ALL test images: 85 %
Accuracy of   sea : 82 %
Accuracy of forest : 95 %
Accuracy of street : 84 %
Accuracy of mountain : 85 %
Accuracy of glacier : 82 %
Accuracy of buildings : 86 %
```

3. Comment on my results.

第 2 點可以發現 T1 的 loss 值向下遞減，訓練的 Accuracy 向上遞增，但是測試的 Accuracy 大約在 epoch 2 就到了 80% 以上。所以我讓 T2 的 VGG16 加上 batch normalization 解決訓練時收斂很慢和防止 gradient vanishing 的問題，在 convolution 的 output 丟到 Max pool 中間做 covariate shift 操作。T2 的 loss 值還沒收斂，訓練 的 Accuracy 向上遞增，測試的 Accuracy 大約介於 80% 到 90% 之間。T2 的 epoch 可 以再增加。

T1 所有圖片的測試準確率為 83%。

T2 所有圖片的測試準確率為 85%。

Accuracy of sea (90% -> 82%)

Accuracy of forest (96% -> 95%)

Accuracy of street (91% -> 84%)

Accuracy of mountain (70% -> 85%)

Accuracy of glacier (72% -> 82%)

Accuracy of buildings (80% -> 86%)

4. Problem and difficulties.

T1 和 T2 訓練的 Accuracy 非常的高分，但在測試階段，測試的 Accuracy 通常到 80% 到 90%就沒沒有在上去了。