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HW2: Car classification

1. Describe the models you use, including how to run you test?

Train ResNet101 model with/without pre-training weights.

seed = 123, epochs = 20, batch_size = 32, optimizer = 'Adam', lr = 0.0001

Files:

prepare.py 裁切圖片

dataset.py 準備資料
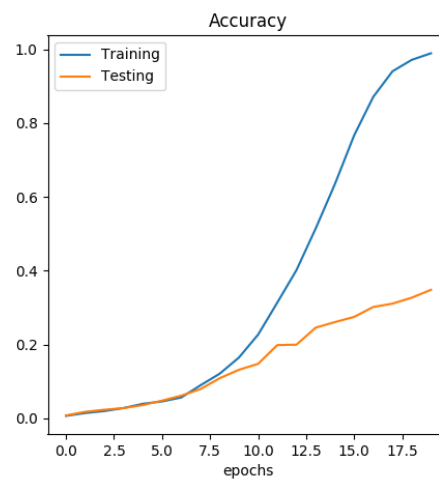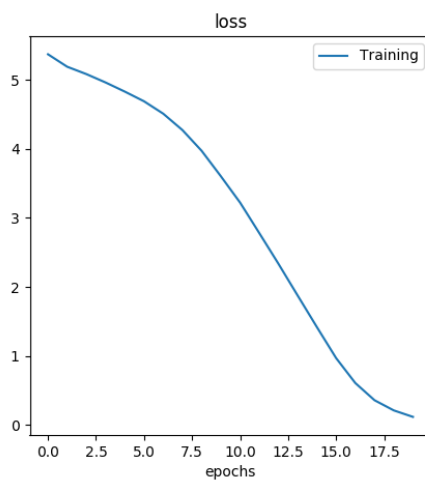
train.py 訓練

test.py 測試
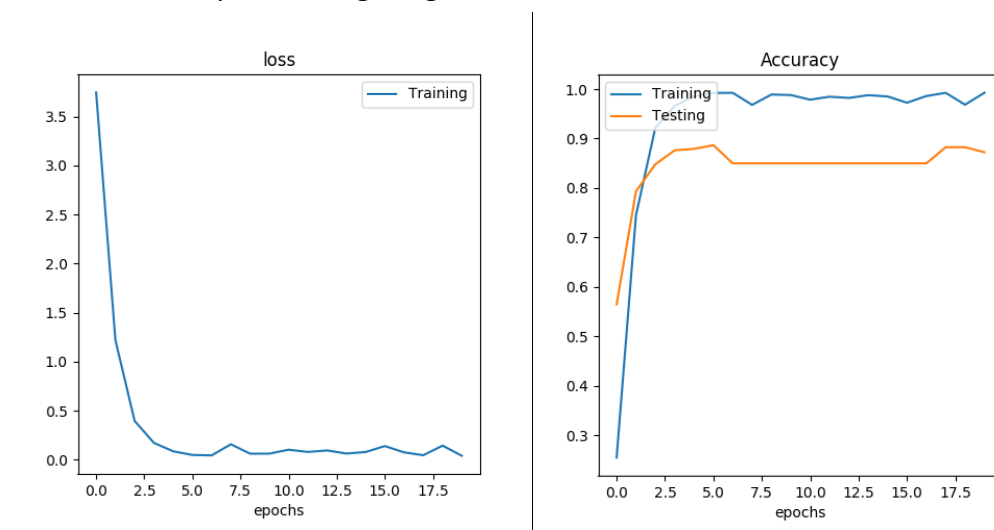
out.py 畫圖

Steps:

python prepare.py

python train.py

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

T1 model: without pre-training weights.

T2 model: with pre-training weights.

T1 test results.

```
Accuracy on the ALL test images: 34 %
Accuracy of    63 : 20 %
Accuracy of    41 : 51 %
Accuracy of   177 : 34 %
Accuracy of   117 : 57 %
Accuracy of   185 : 18 %
Accuracy of    54 : 35 %
Accuracy of   155 : 42 %
Accuracy of    70 : 28 %
Accuracy of    86 : 64 %
Accuracy of     6 : 36 %
Accuracy of   124 : 28 %
Accuracy of   159 : 33 %
Accuracy of    46 : 37 %
Accuracy of   110 : 51 %
Accuracy of    38 : 12 %
Accuracy of   181 : 39 %
Accuracy of    40 : 33 %
Accuracy of   151 : 44 %
Accuracy of    49 : 32 %
Accuracy of   169 : 21 %
```

T2 test results.

```
Accuracy on the ALL test images: 87 %
Accuracy of    63 : 97 %
Accuracy of    41 : 45 %
Accuracy of   177 : 81 %
Accuracy of   117 : 97 %
Accuracy of   185 : 97 %
Accuracy of    54 : 57 %
Accuracy of   155 : 88 %
Accuracy of    70 : 78 %
Accuracy of    86 : 97 %
Accuracy of     6 : 95 %
Accuracy of   124 : 100 %
Accuracy of   159 : 91 %
Accuracy of    46 : 83 %
Accuracy of   110 : 100 %
Accuracy of    38 : 92 %
Accuracy of   181 : 84 %
Accuracy of    40 : 87 %
Accuracy of   151 : 93 %
Accuracy of    49 : 97 %
Accuracy of   169 : 97 %
```

3. Discussion

　　用 pre-training weights 的模型可以得到 all image test 87%的準確率，對應到同樣訓練 20 個 epoch，without pre-training weights 的模型只有 34%的準確率。討論到 curve，用 pre-training weights 可以看到 loss 在前面幾個 epoch 已經快速下降，到 4 至 5 個 epoch 就開始收斂，accuracy 同理，然而 without pre-training weights 則是平滑的下降，到第 20 個 epoch 也還沒收斂。訓練的 accuracy 雖然很高到 98 至 99%，不過拿去測試後 accuracy 並沒有如同 pre-training weights 的模型來的高。

4. Problem and difficulties

　　一開始 pre-training weights model 的 learning rate = 0.001 來使用，結果 all test accuracy 只有 57%，所以 learning rate 的選用其實很重要。