國立中興大學　電機工程學系

車用電子導論 LAB1

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程式部分1-1與1-2寫在同一份檔案可由註解搜尋

Lab1-1：

(A) Input size： 32*32

(B) Batch size： 64

(C) Epochs： 500

(D) Optimizer：SGD

(a)learn rate： 0.03　　(b)decay：1e-6

(c)momentum： 0.9　　(d)nesterov：True

Fig.1　架構圖

```
_____
conv2d_2 (Conv2D)           (None, 16, 16, 64)        18496
_____
average_pooling2d_1 (Average (None, 8, 8, 64)          0
_____
dropout_2 (Dropout)         (None, 8, 8, 64)          0
_____
flatten_1 (Flatten)         (None, 4096)              0
_____
dense_1 (Dense)             (None, 64)                262208
_____
dropout_3 (Dropout)         (None, 64)                0
_____
dense_2 (Dense)             (None, 4)                 260
================================================================
Total params: 281,860
Trainable params: 281,860
Non-trainable params: 0
_____


_____
conv2d_2 (Conv2D)           (None, 16, 16, 64)        18496
_____
average_pooling2d_1 (Average (None, 8, 8, 64)          0
_____
dropout_2 (Dropout)         (None, 8, 8, 64)          0
_____
flatten_1 (Flatten)         (None, 4096)              0
_____
dense_1 (Dense)             (None, 64)                262208
_____
dropout_3 (Dropout)         (None, 64)                0
_____
dense_2 (Dense)             (None, 4)                 260
================================================================
Total params: 281,860
Trainable params: 281,860
Non-trainable params: 0
_____
```

Fig.2　　Loss photo
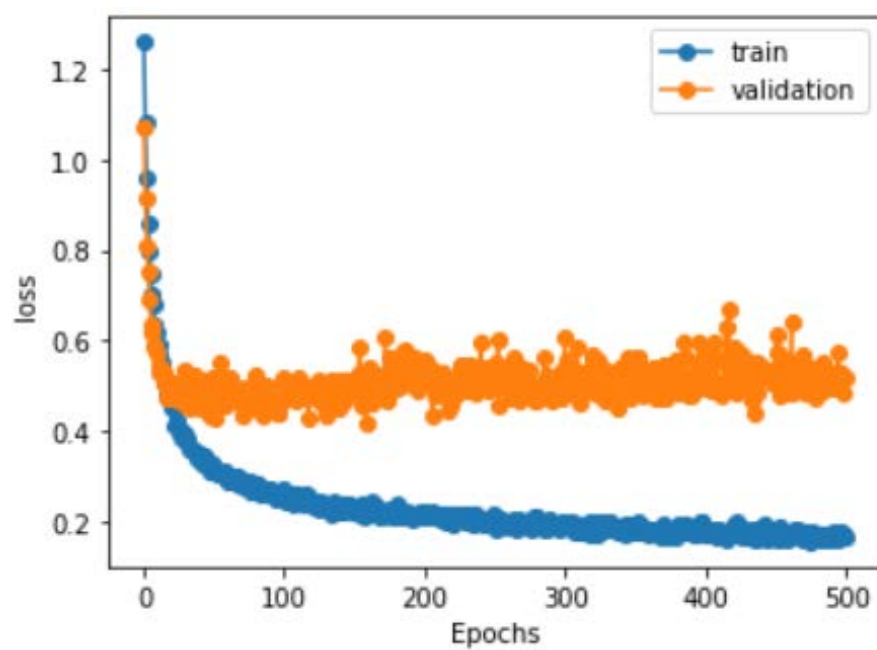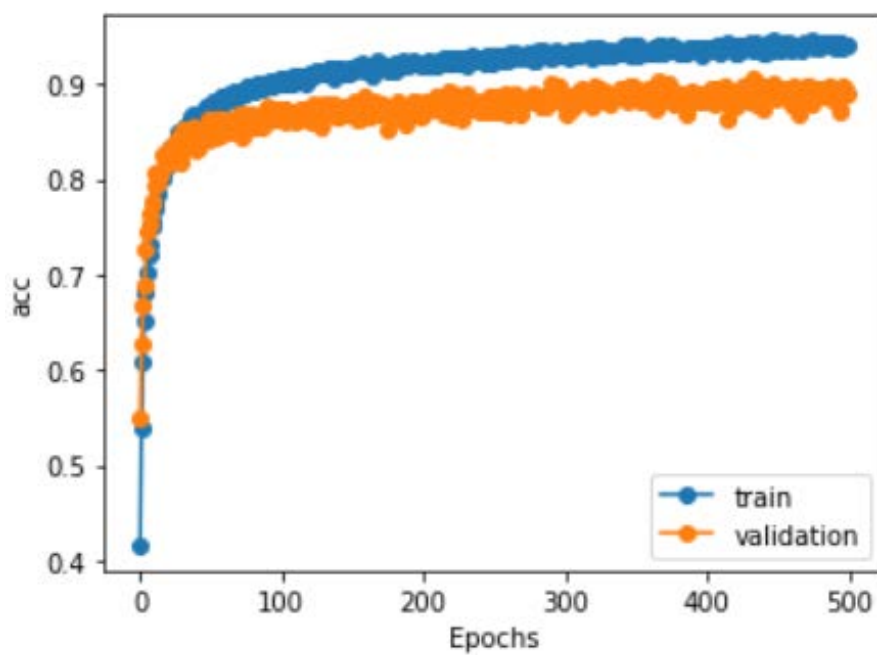

Fig.3　　Accuracy photo

Training-R

(A)   Recall：0.9883321894303363

(B)   Precision：0.9869773817683345

(C)   Accuracy：0.9873439370617411

(D)   F1-Score：0.9876543209876542

Training-L

(A)   Recall：0.9911525585844094

(B)   Precision：0.985965746907707

(C)   Accuracy：0.9873439370617411

(D)   F1-Score：0.9885523491533509

Training-F

(A)   Recall：0.9861237488626023

(B)   Precision：0.9852272727272727

(C)   Accuracy：0.9873439370617411

(D)   F1-Score：0.985675306957708

Training-B

(A)   Recall：0.984102787456446

(B)   Precision：0.9910087719298246

(C)　Accuracy：0.9873439370617411

(D)　F1-Score：0.9875437062937062

Testing-R

(A)　Recall：0.888888888888888

(B)　Precision：0.8688524590163934

(C)　Accuracy：0.8835897432229458

(D)　F1-Score：0.8787564766839379

Testing-L

(A)　Recall：0.92

(B)　Precision：0.905511811023622

(C)　Accuracy：0.8835897432229458

(D)　F1-Score：0.9126984126984128

Testing-F

(A)　Recall：0.8680851063829788

(B)　Precision：0.8553459119496856

(C)　Accuracy：0.8835897432229458

(D)　F1-Score：0.8616684266103484

Testing-B

(A)　Recall：0.856858846918489

(B)　Precision：0.9035639412997903

(C)　Accuracy：0.8835897432229458

(D)　F1-Score：0.8795918367346939

Validation-R

(A)　Recall：0.8928571428571429

(B)　Precision：0.8928571428571429

(C)　Accuracy：0.8888888892285165

(D)　F1-Score：0.8928571428571429

Validation-L

(A)　Recall：0.9098143236074271

(B)　Precision：0.8661616161616161

(C)　Accuracy：0.8888888892285165

(D)　F1-Score：0.8874514877102199

Validation-F

(A)　　Recall：0.88

(B)　　Precision：0.8577981651376146

(C)　　Accuracy：0.8888888892285165

(D)　　F1-Score：0.8687572590011614

Validation-B

(A)　　Recall：0.8772277227722772

(B)　　Precision：0.9326315789473684

(C)　　Accuracy：0.8888888892285165

(D)　　F1-Score：0.9040816326530613

Confusion Matrix

```
1  cm_test
```

```
array([[424,   4,  24,  36],
       [  5, 460,  28,  15],
       [ 32,  16, 408,  21],
       [ 16,  20,  10, 431]], dtype=int64)
```

```
1  cm_val
```

```
array([[400,    4,   14,   30],
       [ 11,  343,   23,   19],
       [ 31,   18,  374,   13],
       [  6,   12,   14,  443]], dtype=int64)
```

```
1  cm_train
```

```
array([[4320,     4,    16,     37],
       [  11,  4145,    26,     22],
       [  32,    19,  4335,     14],
       [   8,    14,    19,  4519]], dtype=int64)
```

Lab1-2：

```
Lab1-2/R/LINE_ALBUM_R_211103_0.jpg  spent:  0.016514899999947374
Lab1-2/R/LINE_ALBUM_R_211103_0.jpg  =  Face_R

Lab1-2/R/LINE_ALBUM_R_211103_9.jpg  spent:  0.010247200000321754
Lab1-2/R/LINE_ALBUM_R_211103_9.jpg  =  Face_R
```

```
cnt= 29
cnt_R= 25
cnt_L= 0
cnt_F= 4
cnt_B= 0
total_time= 15.083213399997902
average_time= 0.5201108068964794
```

```
Lab1-2/L/LINE_ALBUM_L_211103_0.jpg  spent:  0.011539000000084343
Lab1-2/L/LINE_ALBUM_L_211103_0.jpg  =  Face_L

Lab1-2/L/LINE_ALBUM_L_211103_4_0.jpg  spent:  0.012322600000061357
Lab1-2/L/LINE_ALBUM_L_211103_4_0.jpg  =  Face_L




cnt= 32
cnt_R= 1
cnt_L= 22
cnt_F= 7
cnt_B= 2
total_time= 0.5545626999996784
average_time= 0.0173300843749895


Lab1-2/F/LINE_ALBUM_F_211103_0.jpg  spent:  0.010295599999608385
Lab1-2/F/LINE_ALBUM_F_211103_0.jpg  =  Face_F

Lab1-2/F/LINE_ALBUM_F_211103_24.jpg  spent:  0.0071975999999267515
Lab1-2/F/LINE_ALBUM_F_211103_24.jpg  =  Face_F




cnt= 31
cnt_R= 2
cnt_L= 3
cnt_F= 26
cnt_B= 0
total_time= 0.4596196000006785
average_time= 0.014826438709699305


Lab1-2/B/LINE_ALBUM_B_211103_0.jpg  spent:  0.035618300000351155
Lab1-2/B/LINE_ALBUM_B_211103_0.jpg  =  Face_B

Lab1-2/B/LINE_ALBUM_B_211103_30.jpg  spent:  0.012592399999903137
Lab1-2/B/LINE_ALBUM_B_211103_30.jpg  =  Face_B




cnt= 31
cnt_R= 5
cnt_L= 5
cnt_F= 7
cnt_B= 14
total_time= 0.8859118000009403
average_time= 0.02857780000003033
```

Fig.6   test result by our photo