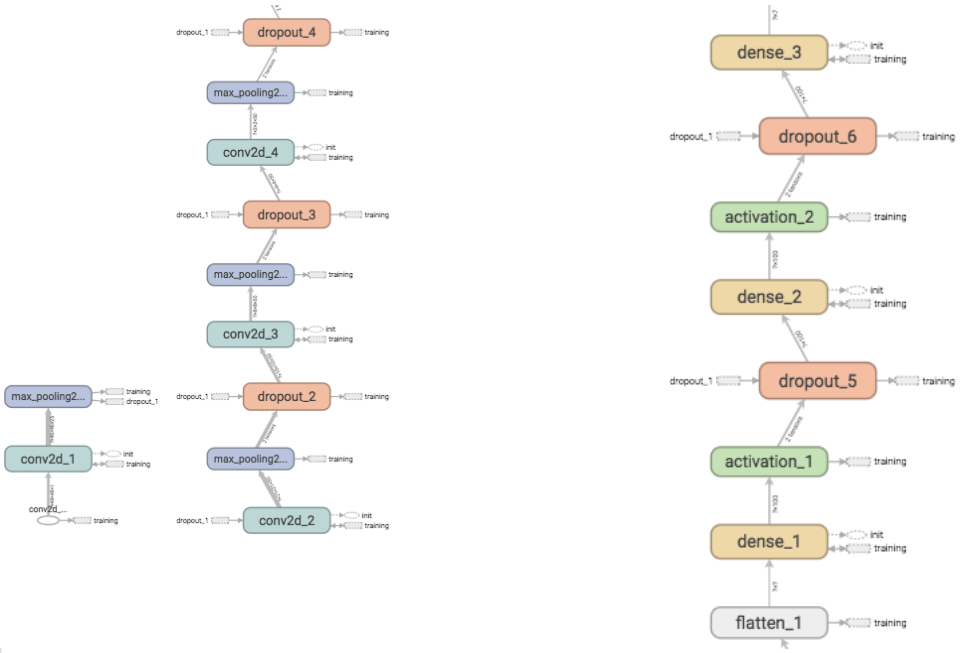
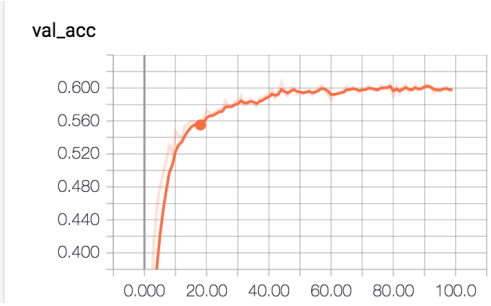
學號：B03902016 系級： 資工四 姓名：周聖筌

1. (1%) 請說明你實作的 CNN model，其模型架構、訓練過程和準確率為何？
(註：寫一二題時最佳模型還沒訓練完，所以是用較差的模型來撰寫)





validation accuracy測試結果

2. (1%) 承上題，請用與上述 CNN 接近的參數量，實做簡單的 DNN model。其模型架構、訓練過程和準確率為何？試與上題結果做比較，並說明你觀察到了什麼？

CNN的model summary

conv2d_1 (Conv2D)	(None, 46, 46, 25)	250
max_pooling2d_1 (MaxPooling2	(None, 23, 23, 25)	0
dropout_1 (Dropout)	(None, 23, 23, 25)	0
conv2d_2 (Conv2D)	(None, 21, 21, 50)	11300
max_pooling2d_2 (MaxPooling2	(None, 10, 10, 50)	0
dropout_2 (Dropout)	(None, 10, 10, 50)	0
conv2d_3 (Conv2D)	(None, 8, 8, 50)	22550
max_pooling2d_3 (MaxPooling2	(None, 4, 4, 50)	0
dropout_3 (Dropout)	(None, 4, 4, 50)	0
conv2d_4 (Conv2D)	(None, 2, 2, 50)	22550
max_pooling2d_4 (MaxPooling2	(None, 1, 1, 50)	0
dropout_4 (Dropout)	(None, 1, 1, 50)	0
flatten_1 (Flatten)	(None, 50)	0

dense_1 (Dense)	(None, 100)	5100
activation_1 (Activation)	(None, 100)	0
dropout_5 (Dropout)	(None, 100)	0
dense_2 (Dense)	(None, 100)	10100
activation_2 (Activation)	(None, 100)	0
dropout_6 (Dropout)	(None, 100)	0
dense_3 (Dense)	(None, 100)	10100
activation_3 (Activation)	(None, 100)	0
dropout_7 (Dropout)	(None, 100)	0
dense_4 (Dense)	(None, 7)	707
activation_4 (Activation)	(None, 7)	0

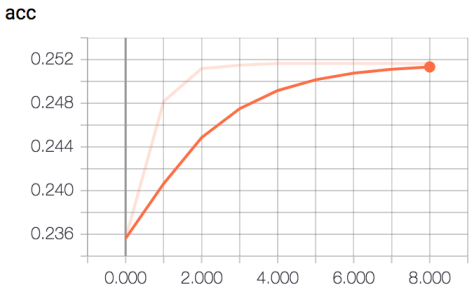
Total params: 82,657
Trainable params: 82,657
Non-trainable params: 0

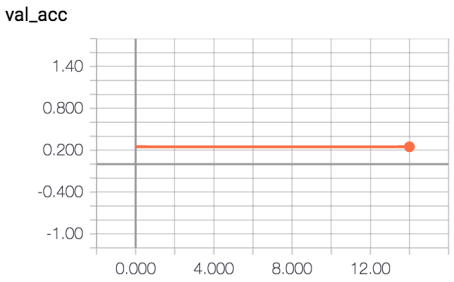
DNN的model summary

Layer (type)	Output Shape	Param #
dense_1 (Dense)	(None, 35)	80675
activation_1 (Activation)	(None, 35)	0
dropout_1 (Dropout)	(None, 35)	0
dense_2 (Dense)	(None, 35)	1260
activation_2 (Activation)	(None, 35)	0
dropout_2 (Dropout)	(None, 35)	0
dense_3 (Dense)	(None, 35)	1260
activation_3 (Activation)	(None, 35)	0
dropout_3 (Dropout)	(None, 35)	0
dense_4 (Dense)	(None, 7)	252
activation_4 (Activation)	(None, 7)	0

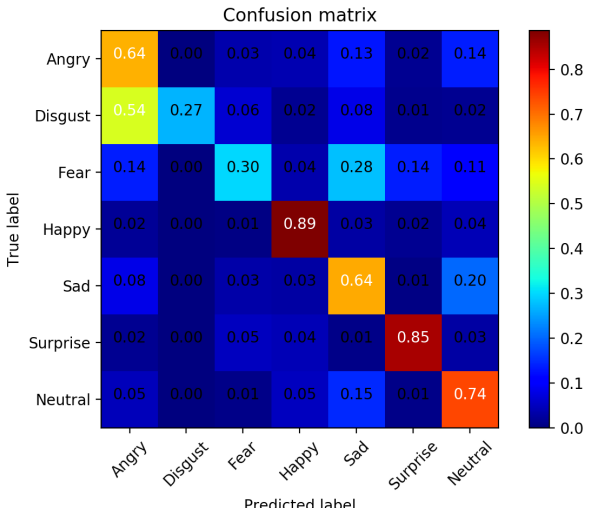
Total params: 83,447
Trainable params: 83,447
Non-trainable params: 0

同樣的參數量，DNN幾乎完全train不起





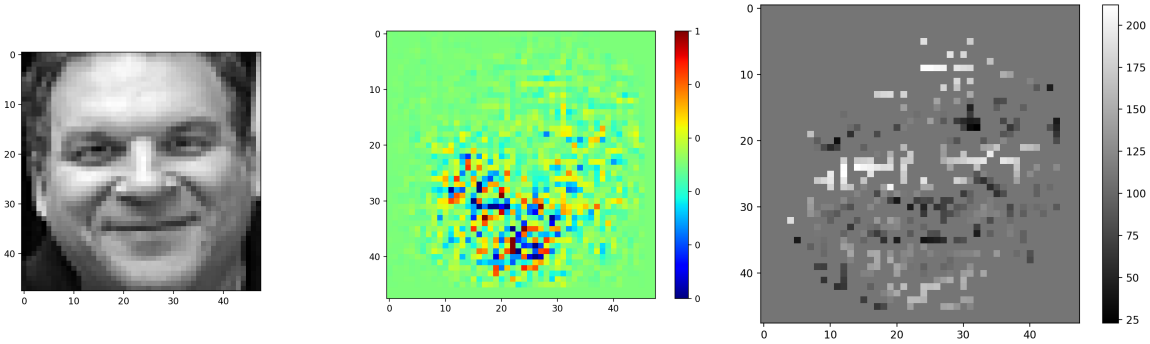
3. (1%) 觀察答錯的圖片中，哪些 class 彼此間容易用混？[繪出 confusion matrix 分析]



由右圖的confusion matrix，可以看出Disgust的class判斷率最差，幾乎都被判定為Angry，但在測Angry時判斷率又是不錯的。而在測Fear的class時，也會常常被判定為Sad，但判斷對的比例還是比其他都高一些。

4.(1%) 從(1)(2)可以發現，使用 CNN 的確有些好處，試繪出其 saliency maps，觀察模型在做 classification 時，是 focus 在圖片的哪些部份？
（註：我是挑第15張圖片來測4，5題。）

從圖上判斷，應該是focus在嘴巴和臉頰的部分



5. (1%) 承(1)(2)，利用上課所提到的 gradient ascent 方法，觀察特定層的filter最容易被哪種圖片 activate。