HW3 Report

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1. (2%) 請說明你實作的 CNN model, 其模型架構、訓練參數和準確率為何？並請用與上述 CNN 接近的參數量, 實做簡單的 DNN model, 同時也說明其模型架構、訓練參數和準確率為何？並說明你觀察到了什麼？

CNN:

```
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_1 (Conv2D)            (None, 48, 48, 64)        640
leaky_re_lu_1 (LeakyReLU)    (None, 48, 48, 64)        0
batch_normalization_1 (Batch (None, 48, 48, 64)        256
max_pooling2d_1 (MaxPooling2 (None, 24, 24, 64)        0
dropout_1 (Dropout)          (None, 24, 24, 64)        0
flatten_1 (Flatten)          (None, 4608)              0
dense_1 (Dense)              (None, 256)               1179904
batch_normalization_5 (Batch (None, 256)               1024
dropout_5 (Dropout)          (None, 256)               0
=================================================================
Total params: 2,871,815
Trainable params: 2,868,359
Non-trainable params: 3,456
```

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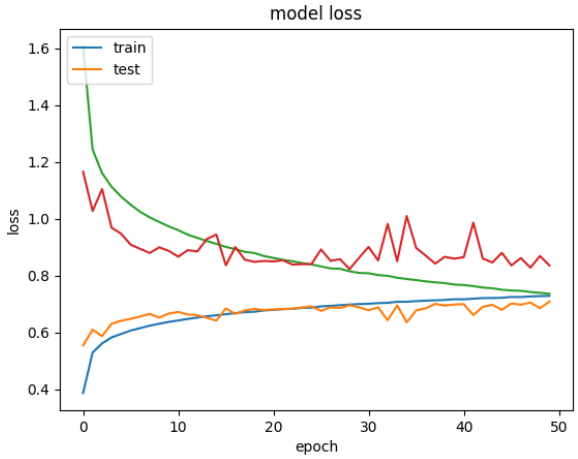
DNN:

```
Layer (type)                 Output Shape              Param #
=================================================================
flatten_1 (Flatten)          (None, 2304)              0
dense_1 (Dense)              (None, 1024)              2360320
leaky_re_lu_1 (LeakyReLU)    (None, 1024)              0
batch_normalization_1 (Batch (None, 1024)              4096
dropout_1 (Dropout)          (None, 1024)              0
dense_2 (Dense)              (None, 512)               524800
leaky_re_lu_2 (LeakyReLU)    (None, 512)               0
batch_normalization_2 (Batch (None, 512)               2048
dropout_2 (Dropout)          (None, 512)               0
dense_3 (Dense)              (None, 7)                 3591
activation_1 (Activation)    (None, 7)                 0
=================================================================
Total params: 2,894,855
Trainable params: 2,891,783
Non-trainable params: 3,072
```

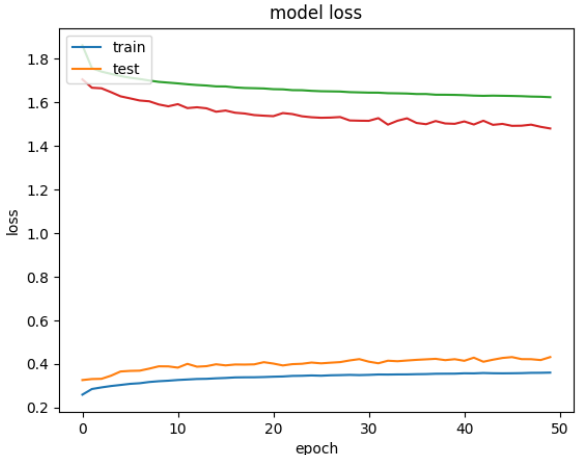
兩者都用了差不多兩百八十幾萬的參數，用batch_size = 128, epoch = 50的參數訓練，結果看起來，CNN的方法效果好很多。

2. (1%) 承上題, 請分別畫出這兩個model的訓練過程 (i.e., loss/accuracy v.s. epoch)

CNN:



DNN:



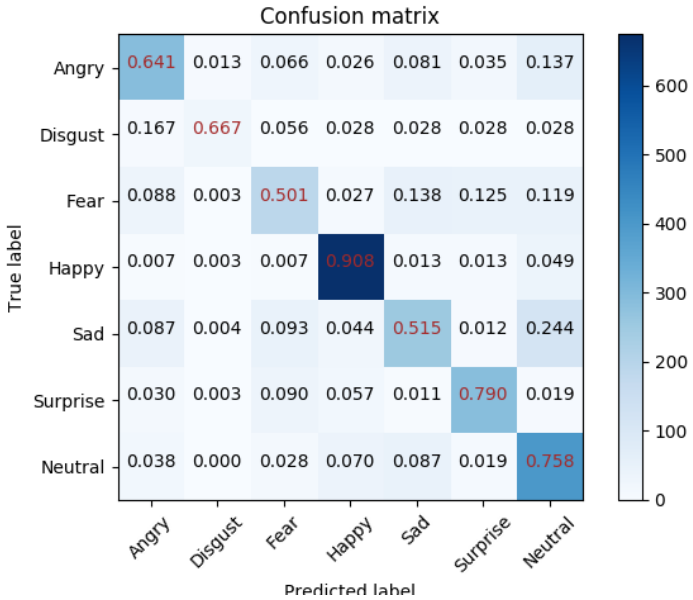
兩張圖中上面兩條線（綠色、紅色）分別代表training和validation的loss，而下面兩條線（藍色、橘色）分別代表training和validation的accuracy。

3. (1%) 請嘗試 data normalization, data augmentation,說明實作方法並且說明實行前後對準確率有什麼樣的影響？

	public acc	private acc
No data normalization & no data augmentation	0.65394	0.62635
Only data normalization	0.63722	0.63137
Both data normalization & data augmentation	0.68347	0.67957

做了data augmentation會增加training data的量，所以會訓練得比較好，結果也是如此，再來，做data normalization也會進步一些。但data augmentation才是結果變好的主要原因。

4. (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]



從confusion matrix中分析，發現錯誤的predict中，sad最容易被辨認成neutral。