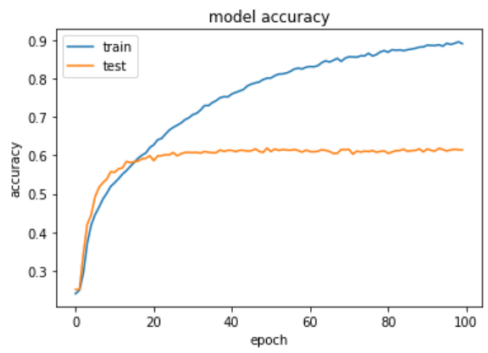
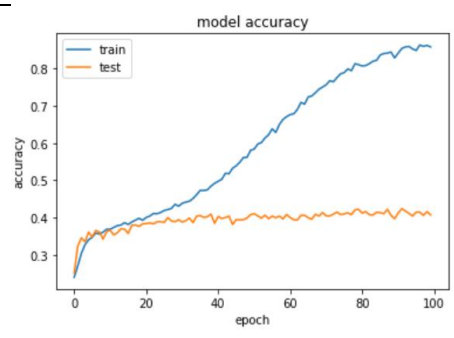
學號：B06902067 系級： 資工二 姓名：許育銘

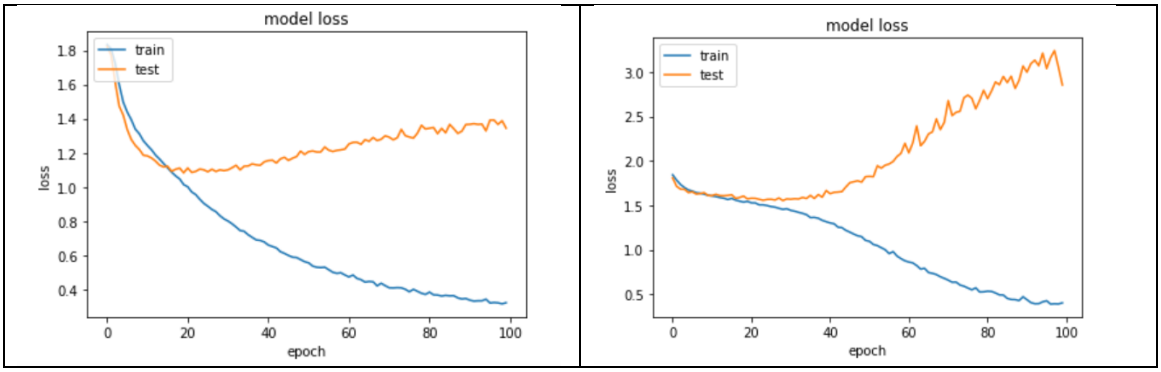
1. (2%) 請說明你實作的 CNN model，其模型架構、訓練參數和準確率為何？並請用與上述 CNN 接近的參數量，實做簡單的 DNN model，同時也說明其模型架構、訓練參數和準確率為何？並說明你觀察到了什麼？
(Collaborators: 無)

	CNN	DNN
模型架構	Layer (type) / Output Shape / Param # conv2d_1 (Conv2D) (None, 46, 46, 64) 640 max_pooling2d_1 (MaxPooling2 (None, 23, 23, 64) 0 dropout_1 (Dropout) (None, 23, 23, 64) 0 conv2d_2 (Conv2D) (None, 21, 21, 128) 73856 max_pooling2d_2 (MaxPooling2 (None, 10, 10, 128) 0 dropout_2 (Dropout) (None, 10, 10, 128) 0 conv2d_3 (Conv2D) (None, 8, 8, 256) 295168 max_pooling2d_3 (MaxPooling2 (None, 4, 4, 256) 0 dropout_3 (Dropout) (None, 4, 4, 256) 0 flatten_1 (Flatten) (None, 4096) 0 dense_1 (Dense) (None, 1024) 4195328 dropout_4 (Dropout) (None, 1024) 0 dense_2 (Dense) (None, 512) 524800 dropout_5 (Dropout) (None, 512) 0 dense_3 (Dense) (None, 256) 131328 dropout_6 (Dropout) (None, 256) 0 dense_4 (Dense) (None, 7) 1799 Total params: 5,222,919 Trainable params: 5,222,919 Non-trainable params: 0	Layer (type) / Output Shape / Param # dense_43 (Dense) (None, 1156) 2664580 dense_44 (Dense) (None, 1024) 1184768 dropout_31 (Dropout) (None, 1024) 0 dense_45 (Dense) (None, 768) 787200 dense_46 (Dense) (None, 512) 393728 dropout_32 (Dropout) (None, 512) 0 dense_47 (Dense) (None, 384) 196992 dense_48 (Dense) (None, 256) 98560 dropout_33 (Dropout) (None, 256) 0 dense_49 (Dense) (None, 7) 1799 Total params: 5,327,627 Trainable params: 5,327,627 Non-trainable params: 0
準確率	public:0.60685 private:0.60741	public:0.41794 private:0.40707

當參數個數相當，DNN 的準確率遠不及 CNN。

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)
(Collaborators: 無)

CNN	DNN
	

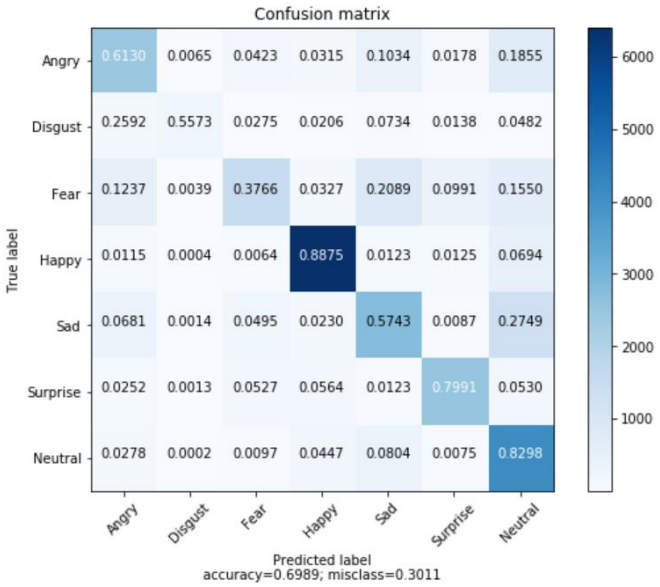


3. (1%) 請嘗試 data normalization, data augmentation,說明實作方法並且說明實行前後對準確率有什麼樣的影響？
(Collaborators: 無)

答： data normalization: 在每一層加入 BatchNormalization()
data augmentation: 利用 keras 的 ImageDataGenerator，每張圖片隨機旋轉 20 度以內、上下左右平移 0.2 以內。

	CNN	CNN+normalization	CNN+normalization+ augmentation
public	0.60685	0.62190	0.64391
private	0.60741	0.63666	0.64586

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]
(Collaborators: 無)



厭惡容易判成憤怒，憤怒容易判成傷心，傷心容易判成中立。