

Detection of anemia system based on nail analysis

1. Method :

1. Workflow:

首先csv檔案中讀取圖片的 path (id + light)，再把data分成7成為training_data，三成為validation_data，防止 overfitting。

2. DNN architecture:

包含五個 cell，每一個 cell 都有兩次的 convolution 和一次的 maxpolling，cell 寬度會越來越寬，目的是為了增加參數，最後會再經過flatten 以及 dropout，把一些無用的特徵給剔除掉。

Layer (type)	Output Shape	Param #
input_1 (InputLayer)	[(None, 224, 224, 3)]	0
conv2d (Conv2D)	(None, 224, 224, 16)	2368
conv2d_1 (Conv2D)	(None, 224, 224, 16)	12560
max_pooling2d (MaxPooling2D)	(None, 112, 112, 16)	0
conv2d_2 (Conv2D)	(None, 112, 112, 32)	25120
conv2d_3 (Conv2D)	(None, 112, 112, 32)	50208
max_pooling2d_1 (MaxPooling2D)	(None, 56, 56, 32)	0
conv2d_4 (Conv2D)	(None, 56, 56, 64)	100416
conv2d_5 (Conv2D)	(None, 56, 56, 64)	200768
max_pooling2d_2 (MaxPooling2D)	(None, 28, 28, 64)	0
conv2d_6 (Conv2D)	(None, 28, 28, 128)	401536
conv2d_7 (Conv2D)	(None, 28, 28, 128)	802944
max_pooling2d_3 (MaxPooling2D)	(None, 14, 14, 128)	0
conv2d_8 (Conv2D)	(None, 14, 14, 256)	1605888
conv2d_9 (Conv2D)	(None, 14, 14, 256)	3211520
max_pooling2d_4 (MaxPooling2D)	(None, 7, 7, 256)	0
flatten (Flatten)	(None, 12544)	0
dropout (Dropout)	(None, 12544)	0
dense (Dense)	(None, 64)	802880
dense_1 (Dense)	(None, 3)	195
Total params: 7,216,403		
Trainable params: 7,216,403		
Non-trainable params: 0		

圖一. DNN architecture

2. Experience :

1. 讀圖片進來時先採用灰階的方式(color_mode="grayscale")

做處理，減少記憶體空間並加快運算時間

2. 由於受限於記憶體大小不足，無法完整一次性的訓練全部圖片，所以採用 batch 的方式批次訓練。

3. 前處理的方式用 ImageDataGenerator 加強圖片

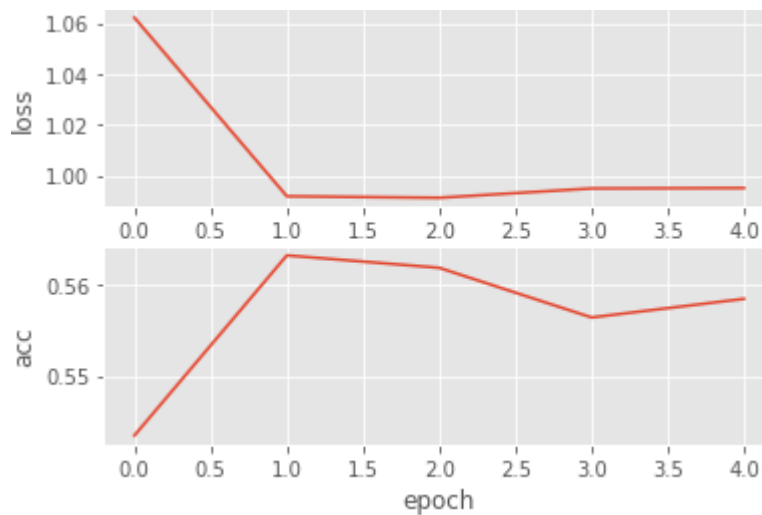
```
train_datagen=ImageDataGenerator(  
    horizontal_flip=True,  
    zca_whitening=True, #做PCA降維  
    data_format='channels_last',  
)
```

3. Result and Conclusion :

訓練五次，以 64 為一個 batch

```
Epoch 1/5
23/22 [=====] - 231s 10s/step - loss: 1.0622 - categorical_accuracy: 0.5435
Epoch 2/5
23/22 [=====] - 233s 10s/step - loss: 0.9919 - categorical_accuracy: 0.5632
Epoch 3/5
23/22 [=====] - 234s 10s/step - loss: 0.9913 - categorical_accuracy: 0.5618
Epoch 4/5
23/22 [=====] - 234s 10s/step - loss: 0.9949 - categorical_accuracy: 0.5564
Epoch 5/5
23/22 [=====] - 233s 10s/step - loss: 0.9951 - categorical_accuracy: 0.5584
```

模型的 loss 和 categorical_accuracy :



Validation accuracy :

accuracy 0.60