

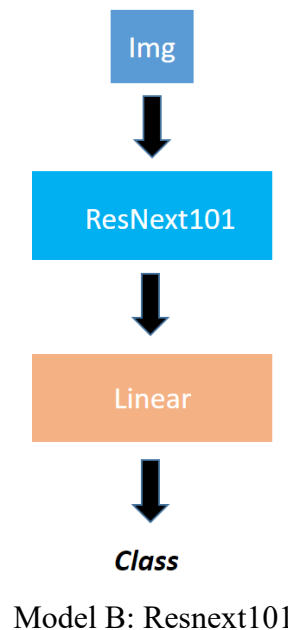
DLCV HW1 Report

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Problem 1

1. Draw the network architecture of method A or B.



2. Report accuracy of your models (both A, B) on the validation set.

Model	Accuracy
A	73.56%
B	90.76%

3. Report your implementation details of model A.

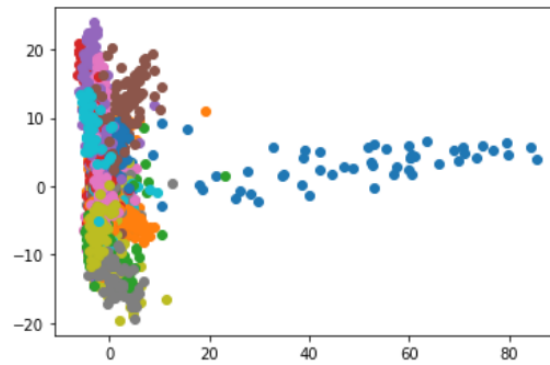
使用的 model 是 VGG16，設定上所有的圖片會 resize 到(224, 224)，做 normailize，並且加上 augmentation，隨機使圖片旋轉、水平翻轉以及轉成灰階圖片。Batch size 為 32，epoch 為 50，lr 設定 1e-4 加上 scheduler 每 10 epoch 將 lr 減半，optimizer 為 SGD，loss 使用 CrossEntropyLoss。

4. Report your alternative model or method in B, and describe its difference from model A.

只有將 model 從 VGG16 改成 Resnext101，其餘設定皆相同。

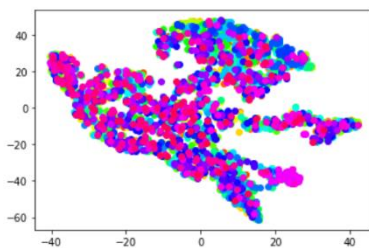
5. Visualize the learned visual representations of model A on the validation set by implementing PCA (Principal Component Analysis) on the output of the second last layer. Briefly explain your result of the PCA visualization.

觀察下方 PCA 降維過後的圖，同顏色的點代表維相同類別，經過線性 PCA 轉換後，倒數第二層 4096 維降維至 2 維，且大多數都集中在第二軸上，同類別會集中一起，但是會重疊，所以不好分辨，不同類別間的關係不一定是如 PCA 降維後所呈現。

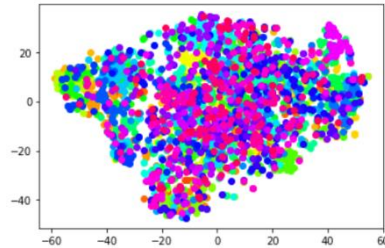


6. Visualize the learned visual representation of model A, again on the output of the second last layer, but using t-SNE (t-distributed Stochastic Neighbor Embedding) instead. Depict your visualization from three different epochs including the first one and the last one. Briefly explain the above results.

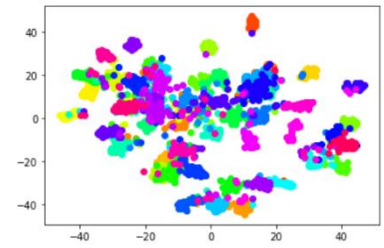
從下圖可看到，epoch 1 同類別的分布情況比較廣，最後一個 epoch 從刻度可看出同類別較為集中，不同類別也相較 epoch 1 及 5 可分辨，訓練越久，model 分辨力越強，從 t-SNE 圖更可以看出不同類別之間的關係以及可清楚分辨出類別。



Epoch 1



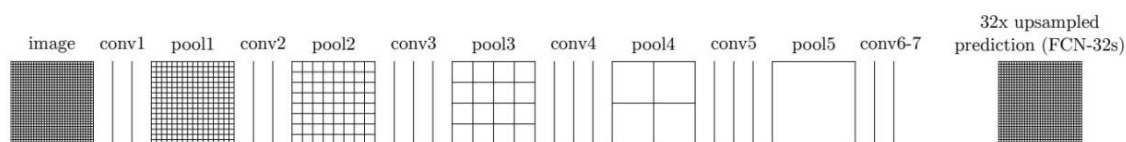
Epoch 5



Epoch 100

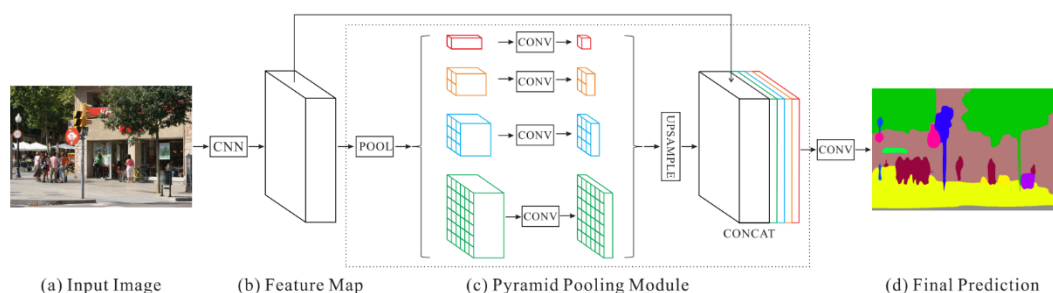
Problem 2

1. Draw the network architecture of your VGG16-FCN32s model (model A).



2. Draw the network architecture of the improved model (model B) and explain it differs from your VGG16-FCN32s model.

抽取 feature 的部分從 VGG16 改成更強的 Resnet101，model A 的 FC32，FCN 換成 pyramid pooling 加 Conv，四個不同 scale 的 feature，可以強力代表不同級別特徵資訊，進而更準確。



3. Report mIoUs of two models on the validation set.

Model	mIoU
A	68.66%
B	76.14%

4. Show the predicted segmentation mask of “validation/0013_sat.jpg”, “validation/0062_sat.jpg”, “validation/0104_sat.jpg” during the early, middle, and the final stage during the training process of the improved model.

Stage	0013	0062	0104
Early			
Middle			
Final			