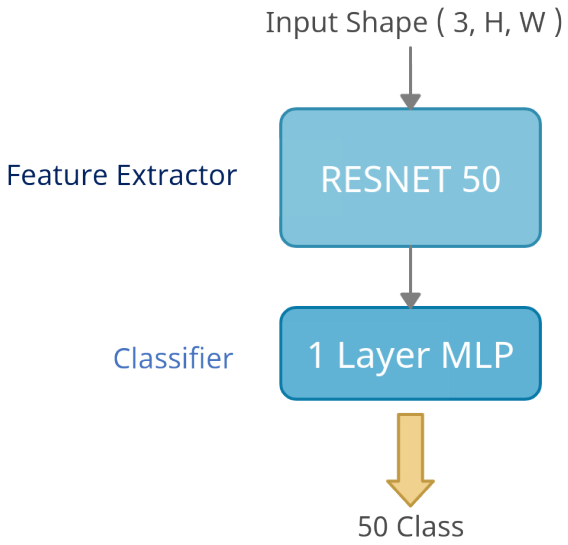
HW1

Coding Status	Coding
Done	☐
Due date	@October 10, 2022
Subject	DLCV
Type	Coding HW

Problem 1: Image Classification

1. Draw the network architecture of method A or B

Model B:



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

- Model A : **59.68%**
- Model B : **87.16%**

3. Report your implementation details of model A.

Model A 中使用類似 **VGG16** 的13層的 CNN 加上3層 MLP

有把照片左右翻轉做資料增生

- Optimizer : **Adam**
- Loss function : **CrossEntropy**

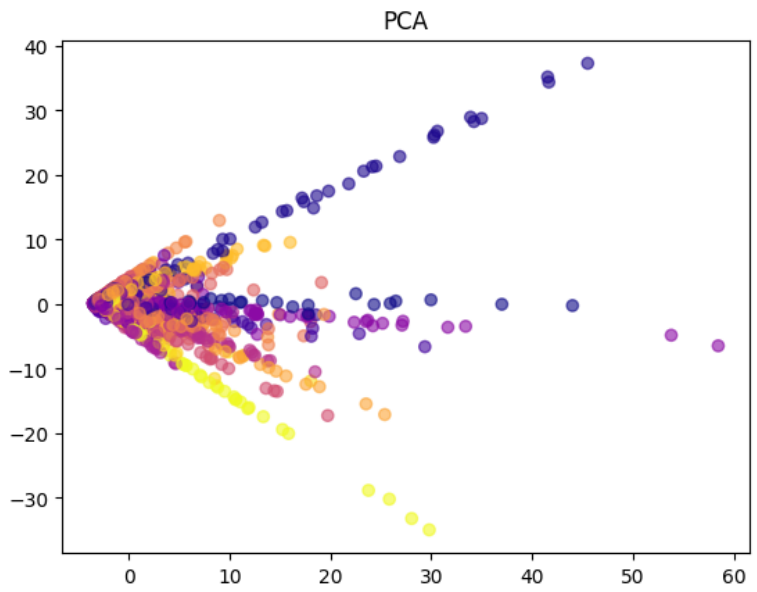
4. Report your alternative model or method in B, and describe its difference from model A.

架構圖如 1. 所示，Resnet50 採用 **pretrained** 過的 weight，由於只有最後一層 Classifier 是新加入的，所以 Learning Rate 由高到低向後遞減（**越靠近 Input lr越高**），以達到 Fine tune Model 的功用。

- Optimizer : **Adam**
- Loss function : **CrossEntropy**

5.Visualize the learned visual representations of model A on the validation set by implementing PCA

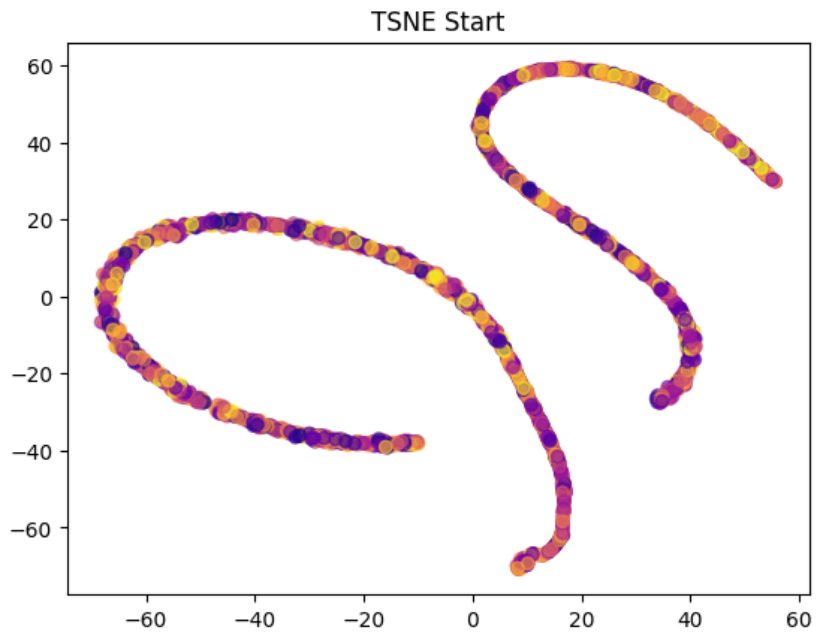
從下圖可以看到多層CNN架構具有一定的特徵提取能力，已經可以將Validation set大致分類。

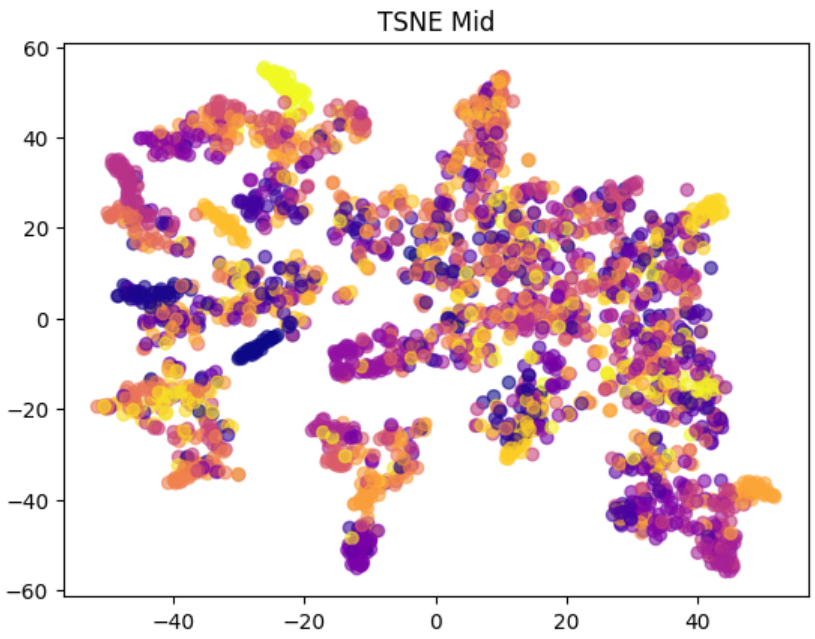


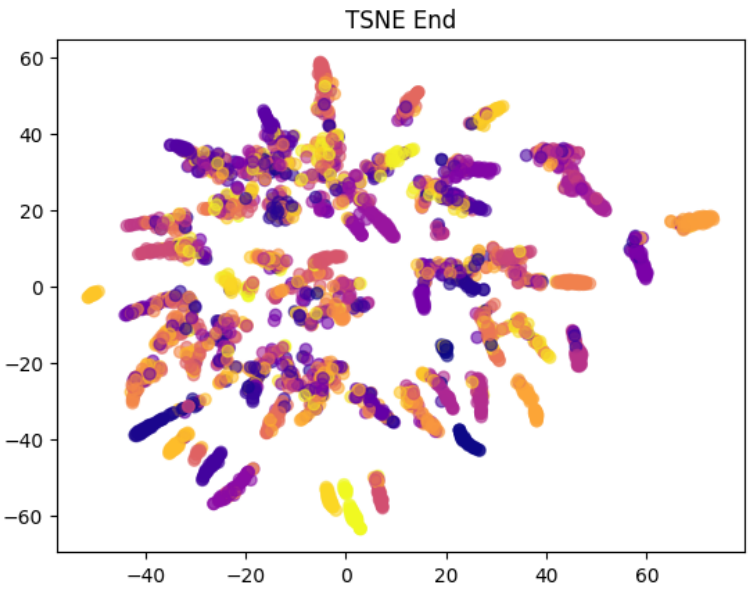
6. Visualize the learned visual representation of model A, again on the output of the second last layer, but using t-SNE

從下面三張圖分別可以看到開始、中期、結束時的epoch做 t-SNE 的結果

可以看出某些資料特徵能漸漸的被分類，尤其在第三張圖可以發現黃色跟橘色很容易就被分類，但紫色跟藍色大多黏在一起，這可能是類別本身就相近，導致模型找不出能分類他們的特徵。

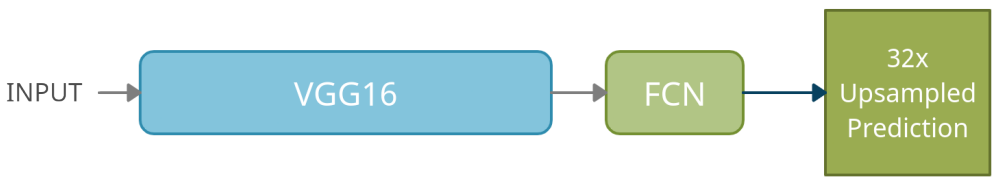






Problem 2: Semantic segmentation

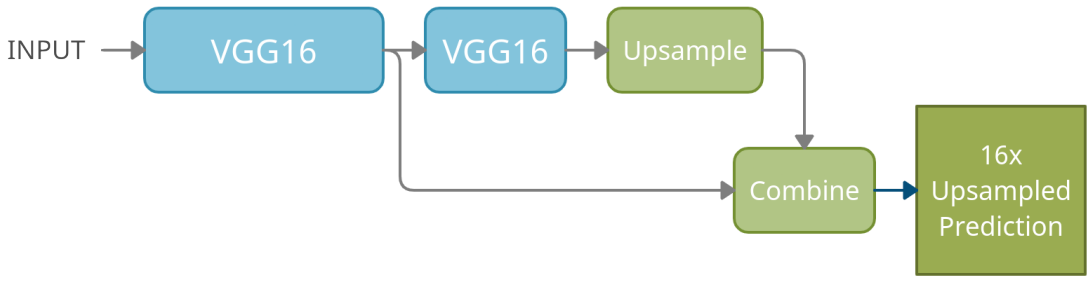
1. Draw the network architecture of your VGG16-FCN32s model (model A).



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

Model B 我使用的是 VGG16-FCN16s，和 FCN32s 的差別在 FCN16會在倒數第 2 個 Pooling層把輸出複製一份出來，再跟 upsample 後的 FCN 結果融合，最後上採樣 16 倍得到結果

這改進了 FCN32 圖像細節無法很好的表示的問題

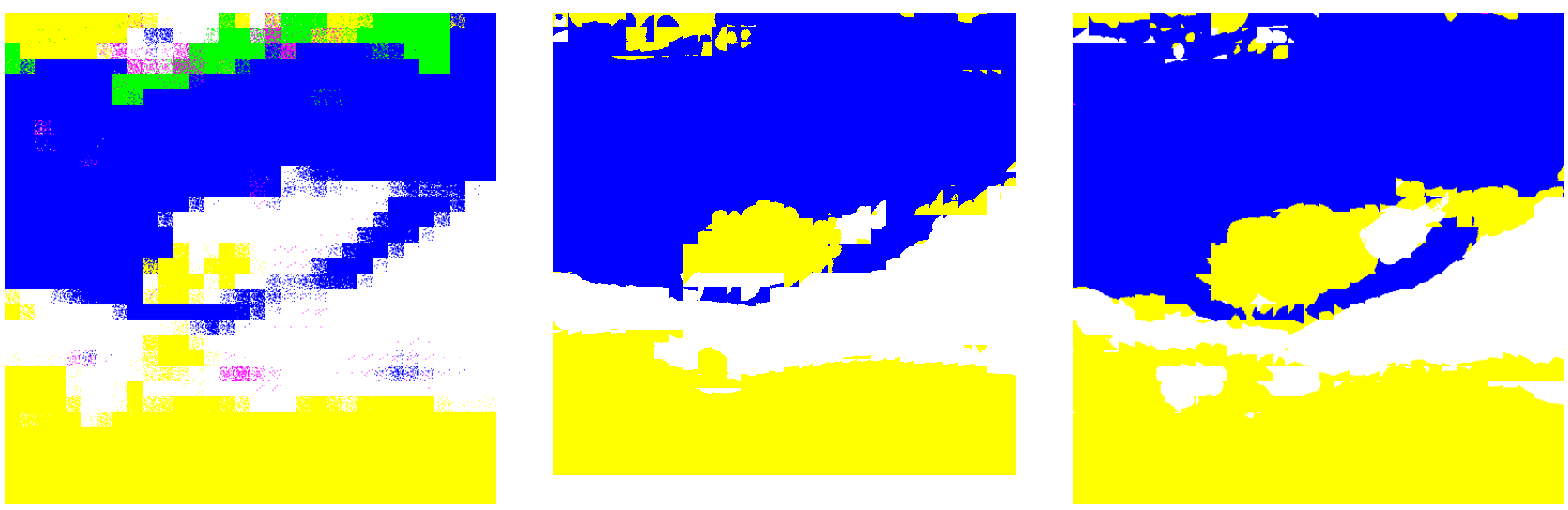


3. Report mIoUs of two models on the validation set.

- Model A : **0.703**
- Model B : **0.736**

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.

- **0013_sat.jpg**



- **0062_sat.jpg**

- **0104_sat.jpg**