Assignment 4 Multitask Learning

Version 1 : ResNet18 + Adam

- Kaggle Category : 0.56459
- Kaggle Attribute : 0.48248

Model

- resnet18
- ReLU()
- Linear(1000, 10) / Linear(1000, 15)
- 2 fully-connected layer

```python
class Mtl_Model(nn.Module):
    def __init__(self):
        super().__init__()
        # using model pretraining
        self.model = models.resnet18(pretrained=True)
        # Category Model
        self.fc1 = nn.Sequential(
            nn.ReLU(),
            nn.Linear(1000, 10))  # ResNet pretrai
        # Attribute Model
        self.fc2 = nn.Sequential(
            nn.ReLU(),
            nn.Linear(1000, 15))

    def forward(self, x):
        if not isinstance(x, torch.Tensor):
            x = torch.Tensor(x)
        x = self.model(x)
        out1 = self.fc1(x)
        out2 = self.fc2(x)
        return out1, out2
```

Loss and optimizer

- optimize function : Adam
- learning rate : 1e-3
- no scheduler

```python
# Category -> CrossEntropyLoss, Attribute -> BCELoss
criterion1, criterion2 = nn.CrossEntropyLoss(), nn.BCEWithLogitsLoss()
optimizer = torch.optim.Adam(model.parameters(), lr=1e-3)
scheduler = optim.lr_scheduler.StepLR(optimizer, step_size=20, gamma=0.1)
```
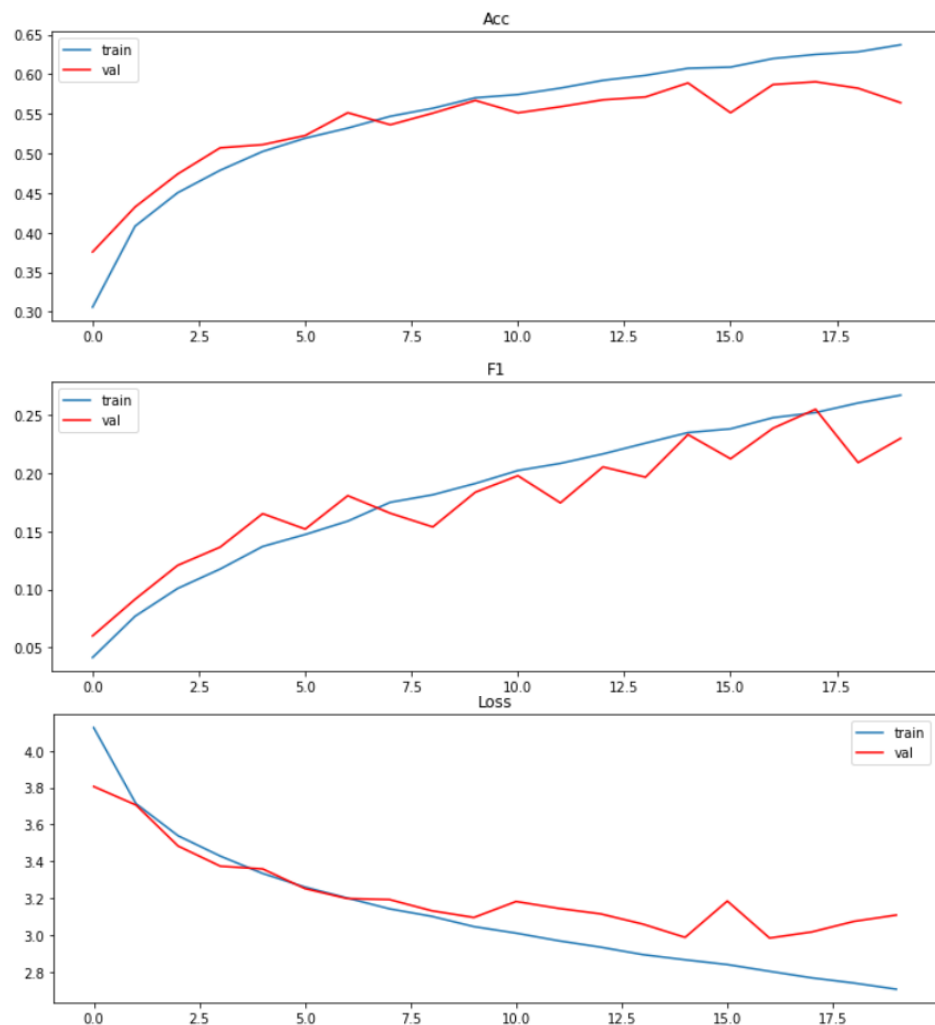
Training

- Epoch : 20

```
==================================== Epoch 1 ====================================
Train Acc (Category): 0.305817 Train F1 (Attribute): 0.041352 Train Loss: 4.125560
 Val Acc (Category): 0.375543  Val F1 (Attribute): 0.059967  Val Loss: 3.805826
==================================== Epoch 2 ====================================
Train Acc (Category): 0.408114 Train F1 (Attribute): 0.076922 Train Loss: 3.712985
 Val Acc (Category): 0.432344  Val F1 (Attribute): 0.091564  Val Loss: 3.705508
==================================== Epoch 3 ====================================
Train Acc (Category): 0.450297 Train F1 (Attribute): 0.100844 Train Loss: 3.538177
 Val Acc (Category): 0.473951  Val F1 (Attribute): 0.120725  Val Loss: 3.482467
==================================== Epoch 4 ====================================
Train Acc (Category): 0.478691 Train F1 (Attribute): 0.117571 Train Loss: 3.427677
 Val Acc (Category): 0.507055  Val F1 (Attribute): 0.136445  Val Loss: 3.372998
==================================== Epoch 5 ====================================
Train Acc (Category): 0.502456 Train F1 (Attribute): 0.137009 Train Loss: 3.333619
 Val Acc (Category): 0.511035  Val F1 (Attribute): 0.165268  Val Loss: 3.358302
==================================== Epoch 6 ====================================
Train Acc (Category): 0.519237 Train F1 (Attribute): 0.147325 Train Loss: 3.259790
 Val Acc (Category): 0.522612  Val F1 (Attribute): 0.151960  Val Loss: 3.251579
==================================== Epoch 7 ====================================
Train Acc (Category): 0.531976 Train F1 (Attribute): 0.158824 Train Loss: 3.200359
 Val Acc (Category): 0.551375  Val F1 (Attribute): 0.180740  Val Loss: 3.197575
==================================== Epoch 8 ====================================
Train Acc (Category): 0.546889 Train F1 (Attribute): 0.175047 Train Loss: 3.141723
 Val Acc (Category): 0.536179  Val F1 (Attribute): 0.165617  Val Loss: 3.191992
==================================== Epoch 9 ====================================
Train Acc (Category): 0.557019 Train F1 (Attribute): 0.181527 Train Loss: 3.100864
 Val Acc (Category): 0.550832  Val F1 (Attribute): 0.153811  Val Loss: 3.131261
```

```
=============================== Epoch 12 ===============================
Train Acc (Category): 0.582498 Train F1 (Attribute): 0.208573 Train Loss: 2.968228
 Val Acc (Category): 0.558973  Val F1 (Attribute): 0.174560  Val Loss: 3.144068
=============================== Epoch 13 ===============================
Train Acc (Category): 0.592244 Train F1 (Attribute): 0.216704 Train Loss: 2.933430
 Val Acc (Category): 0.567656  Val F1 (Attribute): 0.205517  Val Loss: 3.114172
=============================== Epoch 14 ===============================
Train Acc (Category): 0.598537 Train F1 (Attribute): 0.225989 Train Loss: 2.892909
 Val Acc (Category): 0.571274  Val F1 (Attribute): 0.196687  Val Loss: 3.058600
=============================== Epoch 15 ===============================
Train Acc (Category): 0.607490 Train F1 (Attribute): 0.235076 Train Loss: 2.864657
 Val Acc (Category): 0.589001  Val F1 (Attribute): 0.233370  Val Loss: 2.986427
=============================== Epoch 16 ===============================
Train Acc (Category): 0.608999 Train F1 (Attribute): 0.238308 Train Loss: 2.838871
 Val Acc (Category): 0.551375  Val F1 (Attribute): 0.212507  Val Loss: 3.183912
=============================== Epoch 17 ===============================
Train Acc (Category): 0.619794 Train F1 (Attribute): 0.247916 Train Loss: 2.802256
 Val Acc (Category): 0.587012  Val F1 (Attribute): 0.238870  Val Loss: 2.982875
=============================== Epoch 18 ===============================
Train Acc (Category): 0.625013 Train F1 (Attribute): 0.252319 Train Loss: 2.766537
 Val Acc (Category): 0.590449  Val F1 (Attribute): 0.255166  Val Loss: 3.016051
=============================== Epoch 19 ===============================
Train Acc (Category): 0.628338 Train F1 (Attribute): 0.260575 Train Loss: 2.738466
 Val Acc (Category): 0.582308  Val F1 (Attribute): 0.209248  Val Loss: 3.073519
=============================== Epoch 20 ===============================
Train Acc (Category): 0.637189 Train F1 (Attribute): 0.267284 Train Loss: 2.705061
 Val Acc (Category): 0.564038  Val F1 (Attribute): 0.230137  Val Loss: 3.107735
```

Visualize

Version 2 : ResNet18 + Adam + StepLR

- Kaggle Category : 0.58291
- Kaggle Attribute : 0.49437

Model

- resnet18
- ReLU()
- Linear(1000, 10) / Linear(1000, 15)
- 2 fully-connected layer

Loss and optimizer

- optimize function : Adam
- learning rate : 1e-3
- scheduler : StepLR(step_size=5)

```python
criterion1, criterion2 = nn.CrossEntropyLoss(), nn.BCEWithLogitsLoss()
optimizer = torch.optim.Adam(model.parameters(), lr=1e-3)
scheduler = optim.lr_scheduler.StepLR(optimizer, step_size=5, gamma=0.1)
# step_size : lr 下降的間隔數，會在每 5 epoch 下降 10 倍 (lr * gamma)
```

Training

- Epoch : 20

```
================================= Epoch 1 =================================
Train Acc (Category): 0.291262 Train F1 (Attribute): 0.035901 Train Loss: 4.153819
 Val Acc (Category): 0.376628  Val F1 (Attribute): 0.081434  Val Loss: 3.884585
================================= Epoch 2 =================================
Train Acc (Category): 0.397089 Train F1 (Attribute): 0.070138 Train Loss: 3.747718
 Val Acc (Category): 0.421310  Val F1 (Attribute): 0.113664  Val Loss: 3.692006
================================= Epoch 3 =================================
Train Acc (Category): 0.440269 Train F1 (Attribute): 0.092725 Train Loss: 3.573171
 Val Acc (Category): 0.479559  Val F1 (Attribute): 0.084123  Val Loss: 3.438761
================================= Epoch 4 =================================
Train Acc (Category): 0.472040 Train F1 (Attribute): 0.115402 Train Loss: 3.448309
 Val Acc (Category): 0.497467  Val F1 (Attribute): 0.145532  Val Loss: 3.361080
================================= Epoch 5 =================================
Train Acc (Category): 0.496291 Train F1 (Attribute): 0.129127 Train Loss: 3.358669
 Val Acc (Category): 0.498915  Val F1 (Attribute): 0.140286  Val Loss: 3.426463
================================= Epoch 6 =================================
Train Acc (Category): 0.553080 Train F1 (Attribute): 0.173068 Train Loss: 3.087650
 Val Acc (Category): 0.568741  Val F1 (Attribute): 0.215377  Val Loss: 3.055599
================================= Epoch 7 =================================
Train Acc (Category): 0.567635 Train F1 (Attribute): 0.193985 Train Loss: 3.012541
 Val Acc (Category): 0.575434  Val F1 (Attribute): 0.211584  Val Loss: 3.023211
================================= Epoch 8 =================================
Train Acc (Category): 0.578302 Train F1 (Attribute): 0.202562 Train Loss: 2.971195
 Val Acc (Category): 0.581946  Val F1 (Attribute): 0.215021  Val Loss: 2.995041
```

```
============================== Epoch 9 ==============================
Train Acc (Category): 0.585849 Train F1 (Attribute): 0.208264 Train Loss: 2.941615
 Val Acc (Category): 0.580318  Val F1 (Attribute): 0.225827  Val Loss: 2.993855
============================== Epoch 10 ==============================
Train Acc (Category): 0.591118 Train F1 (Attribute): 0.214247 Train Loss: 2.908212
 Val Acc (Category): 0.581223  Val F1 (Attribute): 0.208357  Val Loss: 2.988280
============================== Epoch 11 ==============================
Train Acc (Category): 0.598639 Train F1 (Attribute): 0.216216 Train Loss: 2.871497
 Val Acc (Category): 0.590449  Val F1 (Attribute): 0.232170  Val Loss: 2.958803
============================== Epoch 12 ==============================
Train Acc (Category): 0.600993 Train F1 (Attribute): 0.226080 Train Loss: 2.862651
 Val Acc (Category): 0.588821  Val F1 (Attribute): 0.234432  Val Loss: 2.957969
============================== Epoch 13 ==============================
Train Acc (Category): 0.601939 Train F1 (Attribute): 0.228601 Train Loss: 2.852277
 Val Acc (Category): 0.587735  Val F1 (Attribute): 0.235354  Val Loss: 2.959201
============================== Epoch 14 ==============================
Train Acc (Category): 0.603985 Train F1 (Attribute): 0.229849 Train Loss: 2.845780
 Val Acc (Category): 0.590268  Val F1 (Attribute): 0.239846  Val Loss: 2.952964
============================== Epoch 15 ==============================
Train Acc (Category): 0.604753 Train F1 (Attribute): 0.231022 Train Loss: 2.846544
 Val Acc (Category): 0.589544  Val F1 (Attribute): 0.237851  Val Loss: 2.957595
============================== Epoch 16 ==============================
Train Acc (Category): 0.608999 Train F1 (Attribute): 0.227025 Train Loss: 2.837691
 Val Acc (Category): 0.589001  Val F1 (Attribute): 0.237814  Val Loss: 2.961781
============================== Epoch 17 ==============================
Train Acc (Category): 0.605930 Train F1 (Attribute): 0.230573 Train Loss: 2.841757
 Val Acc (Category): 0.586831  Val F1 (Attribute): 0.236717  Val Loss: 2.956535
============================== Epoch 18 ==============================
Train Acc (Category): 0.606799 Train F1 (Attribute): 0.229875 Train Loss: 2.838674
 Val Acc (Category): 0.587916  Val F1 (Attribute): 0.232333  Val Loss: 2.953469
============================== Epoch 19 ==============================
Train Acc (Category): 0.604625 Train F1 (Attribute): 0.229610 Train Loss: 2.838283
 Val Acc (Category): 0.589544  Val F1 (Attribute): 0.238429  Val Loss: 2.956291
============================== Epoch 20 ==============================
Train Acc (Category): 0.607720 Train F1 (Attribute): 0.229706 Train Loss: 2.836419
 Val Acc (Category): 0.589544  Val F1 (Attribute): 0.236589  Val Loss: 2.952693
```

Visualize

Loss
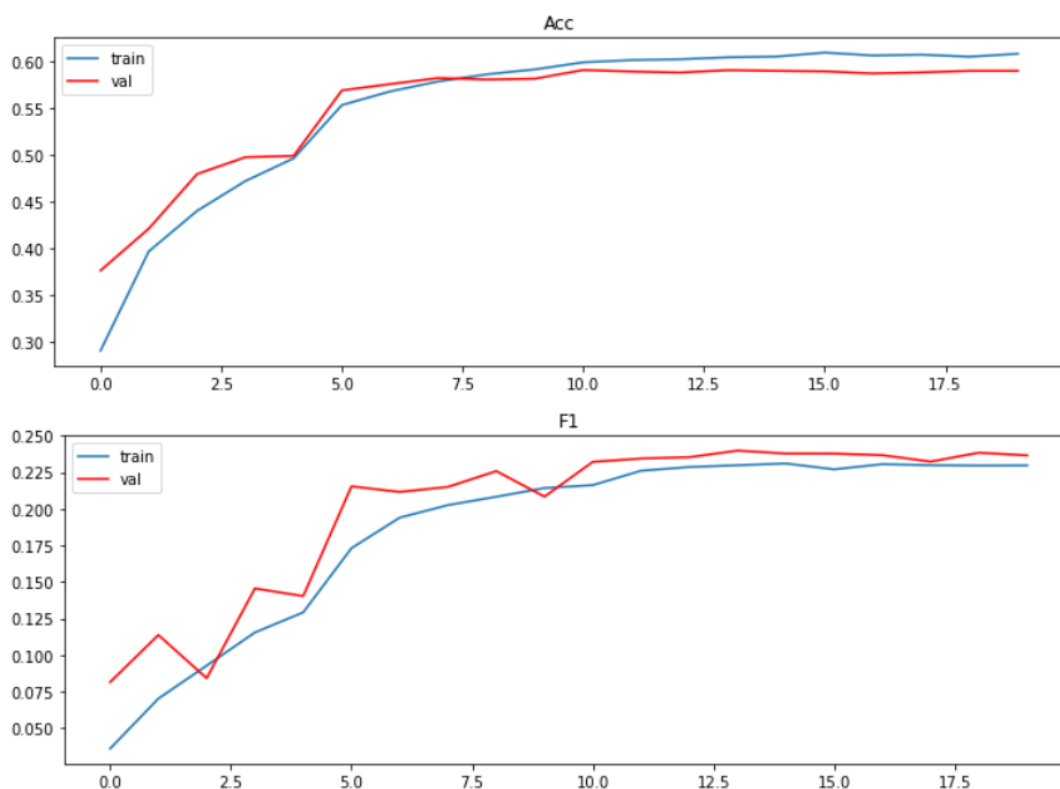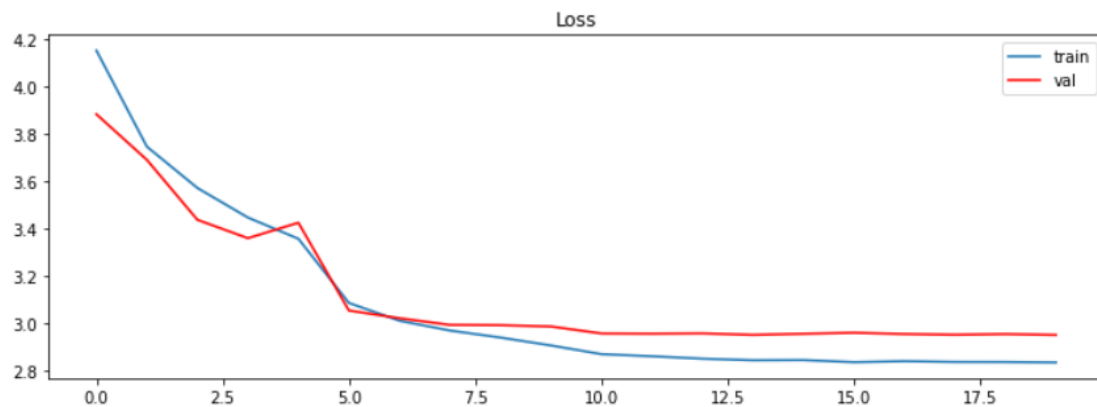
different with last version:

- 加入 scheduler 來調整 lr
- 從圖觀察可發現 model overfitting 的情況有改善
- Category, Attribute 的 Acc 都有改善

Version 3 : ResNet18 + SGD + MultiStepLR

- Kaggle Category : **0.6127**
- Kaggle Attribute : 0.50593

Data Augmentation

- ColorJitter

```
from torchvision import transforms
# For TRAIN
mean=[0.485, 0.456, 0.406]
std=[0.229, 0.224, 0.225]
transforms_train = transforms.Compose([
        transforms.Resize((256, 256)),
        transforms.CenterCrop((224,224)),
        transforms.RandomHorizontalFlip(p=0.5),
        transforms.ColorJitter(brightness=0.2, contrast=0.2, saturation=0.1, hue=0.1),
        transforms.RandomRotation(degrees=(-90, 90)),
        transforms.ToTensor(),
        transforms.Normalize(mean, std),
    ])

# For VAL, TEST
transforms_test = transforms.Compose([
        transforms.Resize((256,256)),
        transforms.CenterCrop((224,224)),
        transforms.ToTensor(),
        transforms.Normalize(mean, std),
    ])
```

Model

- resnet18
- ReLU()
- Linear(1000, 10) / Linear(1000, 15)
- 2 fully-connected layer

Loss and optimizer

- optimize function : SGD
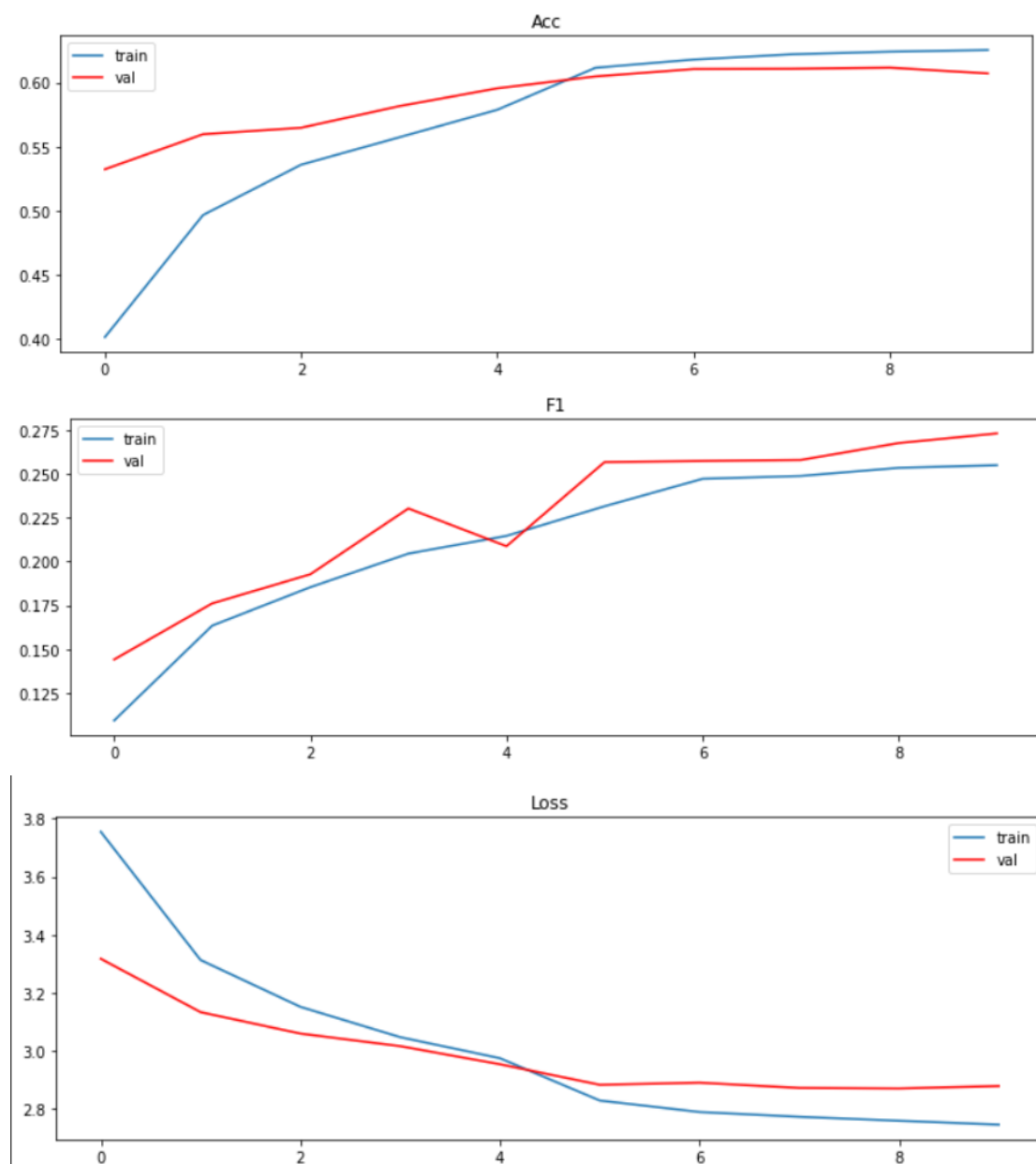- learning rate : 1e-3
- scheduler : MultiStepLR(step_size=5)

```
criterion1, criterion2 = nn.CrossEntropyLoss(), nn.BCEWithLogitsLoss()
optimizer = torch.optim.SGD(model.parameters(), lr=0.001, momentum=0.9)
scheduler = optim.lr_scheduler.MultiStepLR(optimizer, milestones=[5, 10], gamma=0.1, last_epoch=-1)
# StepLR: lr 按間隔下降, MultiStepLR: lr 按指定的間隔調整
```

Training

- Epoch : 10

```
==================================== Epoch 1 ====================================
Train Acc (Category): 0.401566 Train F1 (Attribute): 0.109197 Train Loss: 3.754664
 Val Acc (Category): 0.532381  Val F1 (Attribute): 0.144030  Val Loss: 3.317584
==================================== Epoch 2 ====================================
Train Acc (Category): 0.496700 Train F1 (Attribute): 0.163372 Train Loss: 3.313214
 Val Acc (Category): 0.559696  Val F1 (Attribute): 0.176067  Val Loss: 3.133883
==================================== Epoch 3 ====================================
Train Acc (Category): 0.535941 Train F1 (Attribute): 0.185310 Train Loss: 3.152187
 Val Acc (Category): 0.564761  Val F1 (Attribute): 0.192680  Val Loss: 3.060089
==================================== Epoch 4 ====================================
Train Acc (Category): 0.557301 Train F1 (Attribute): 0.204488 Train Loss: 3.047791
 Val Acc (Category): 0.581585  Val F1 (Attribute): 0.230253  Val Loss: 3.016866
==================================== Epoch 5 ====================================
Train Acc (Category): 0.578788 Train F1 (Attribute): 0.214598 Train Loss: 2.975360
 Val Acc (Category): 0.595514  Val F1 (Attribute): 0.208717  Val Loss: 2.954534
==================================== Epoch 6 ====================================
Train Acc (Category): 0.611506 Train F1 (Attribute): 0.231508 Train Loss: 2.829746
 Val Acc (Category): 0.604740  Val F1 (Attribute): 0.256733  Val Loss: 2.883869
==================================== Epoch 7 ====================================
Train Acc (Category): 0.617901 Train F1 (Attribute): 0.247193 Train Loss: 2.790080
 Val Acc (Category): 0.610528  Val F1 (Attribute): 0.257378  Val Loss: 2.891064
==================================== Epoch 8 ====================================
Train Acc (Category): 0.622020 Train F1 (Attribute): 0.248801 Train Loss: 2.773779
 Val Acc (Category): 0.610709  Val F1 (Attribute): 0.257934  Val Loss: 2.873022
==================================== Epoch 9 ====================================
Train Acc (Category): 0.624041 Train F1 (Attribute): 0.253464 Train Loss: 2.760017
 Val Acc (Category): 0.611614  Val F1 (Attribute): 0.267600  Val Loss: 2.871168
=================================== Epoch 10 ====================================
Train Acc (Category): 0.625345 Train F1 (Attribute): 0.254953 Train Loss: 2.746684
 Val Acc (Category): 0.607091  Val F1 (Attribute): 0.273090  Val Loss: 2.879568
```

Visualize

different with last version:

- data augmentation 加入 ColorJitter
- 使用不同的 optimizer Adam -> SGD
- 使用不同的 scheduler
- 減少 Epoch 數量

Version 4 : VGG16

- Kaggle Category : 0.60875
- Kaggle Attribute : **0.5312**

Model

- vgg16
- ReLU()
- Linear(1000, 10) / Linear(1000, 15)
- 2 fully-connected layer

Loss and optimizer

- optimize function : Adam
- learning rate : 1e-4
- no scheduler

```
criterion1,  criterion2 = nn.CrossEntropyLoss(),  nn.BCEWithLogitsLoss()
optimizer = torch.optim.Adam(model.parameters(),  lr=1e-4)
```

Training

- Epoch : 20

```
================================= Epoch 1 =================================
Train Acc (Category): 0.348869 Train F1 (Attribute): 0.066136 Train Loss: 4.038790
 Val Acc (Category): 0.475760  Val F1 (Attribute): 0.130921  Val Loss: 3.471590
================================= Epoch 2 =================================
Train Acc (Category): 0.474701 Train F1 (Attribute): 0.129991 Train Loss: 3.470651
 Val Acc (Category): 0.502171  Val F1 (Attribute): 0.172899  Val Loss: 3.280924
================================= Epoch 3 =================================
Train Acc (Category): 0.522920 Train F1 (Attribute): 0.170472 Train Loss: 3.259797
 Val Acc (Category): 0.539797  Val F1 (Attribute): 0.193048  Val Loss: 3.198995
================================= Epoch 4 =================================
Train Acc (Category): 0.550522 Train F1 (Attribute): 0.193406 Train Loss: 3.125312
 Val Acc (Category): 0.571997  Val F1 (Attribute): 0.225036  Val Loss: 3.046049
================================= Epoch 5 =================================
Train Acc (Category): 0.574210 Train F1 (Attribute): 0.216089 Train Loss: 3.022770
 Val Acc (Category): 0.582489  Val F1 (Attribute): 0.201861  Val Loss: 2.983501
================================= Epoch 6 =================================
Train Acc (Category): 0.588893 Train F1 (Attribute): 0.230726 Train Loss: 2.944901
 Val Acc (Category): 0.591534  Val F1 (Attribute): 0.214743  Val Loss: 2.962095
================================= Epoch 7 =================================
Train Acc (Category): 0.605034 Train F1 (Attribute): 0.244880 Train Loss: 2.870354
 Val Acc (Category): 0.594971  Val F1 (Attribute): 0.244392  Val Loss: 2.922436
================================= Epoch 8 =================================
Train Acc (Category): 0.617543 Train F1 (Attribute): 0.261371 Train Loss: 2.805757
 Val Acc (Category): 0.602569  Val F1 (Attribute): 0.265458  Val Loss: 2.887789
================================= Epoch 9 =================================
Train Acc (Category): 0.628850 Train F1 (Attribute): 0.274768 Train Loss: 2.750945
 Val Acc (Category): 0.597323  Val F1 (Attribute): 0.268358  Val Loss: 2.889053
================================= Epoch 10 =================================
Train Acc (Category): 0.640822 Train F1 (Attribute): 0.283879 Train Loss: 2.695395
```

```
 Val Acc (Category): 0.589001  Val F1 (Attribute): 0.287074  Val Loss: 2.964580
================================= Epoch 11 =================================
Train Acc (Category): 0.651873 Train F1 (Attribute): 0.295587 Train Loss: 2.646747
 Val Acc (Category): 0.601664  Val F1 (Attribute): 0.270236  Val Loss: 2.908314
================================= Epoch 12 =================================
Train Acc (Category): 0.657858 Train F1 (Attribute): 0.307317 Train Loss: 2.592275
 Val Acc (Category): 0.607272  Val F1 (Attribute): 0.299461  Val Loss: 2.883534
================================= Epoch 13 =================================
Train Acc (Category): 0.668014 Train F1 (Attribute): 0.320030 Train Loss: 2.541100
 Val Acc (Category): 0.613242  Val F1 (Attribute): 0.331007  Val Loss: 2.882379
================================= Epoch 14 =================================
Train Acc (Category): 0.677172 Train F1 (Attribute): 0.330563 Train Loss: 2.493333
 Val Acc (Category): 0.600217  Val F1 (Attribute): 0.312589  Val Loss: 2.894563
================================= Epoch 15 =================================
Train Acc (Category): 0.688325 Train F1 (Attribute): 0.339007 Train Loss: 2.451237
 Val Acc (Category): 0.612699  Val F1 (Attribute): 0.302789  Val Loss: 2.891548
================================= Epoch 16 =================================
Train Acc (Category): 0.694285 Train F1 (Attribute): 0.351229 Train Loss: 2.406102
 Val Acc (Category): 0.605644  Val F1 (Attribute): 0.310251  Val Loss: 2.916493
================================= Epoch 17 =================================
Train Acc (Category): 0.704466 Train F1 (Attribute): 0.357110 Train Loss: 2.363363
 Val Acc (Category): 0.611614  Val F1 (Attribute): 0.347250  Val Loss: 2.888574
================================= Epoch 18 =================================
Train Acc (Category): 0.712320 Train F1 (Attribute): 0.369703 Train Loss: 2.323118
 Val Acc (Category): 0.614508  Val F1 (Attribute): 0.327584  Val Loss: 2.914089
================================= Epoch 19 =================================
Train Acc (Category): 0.719252 Train F1 (Attribute): 0.379274 Train Loss: 2.277230
 Val Acc (Category): 0.617402  Val F1 (Attribute): 0.321368  Val Loss: 2.893395
================================= Epoch 20 =================================
Train Acc (Category): 0.727719 Train F1 (Attribute): 0.385559 Train Loss: 2.238822
 Val Acc (Category): 0.619573  Val F1 (Attribute): 0.338771  Val Loss: 2.953790
```

Visualize
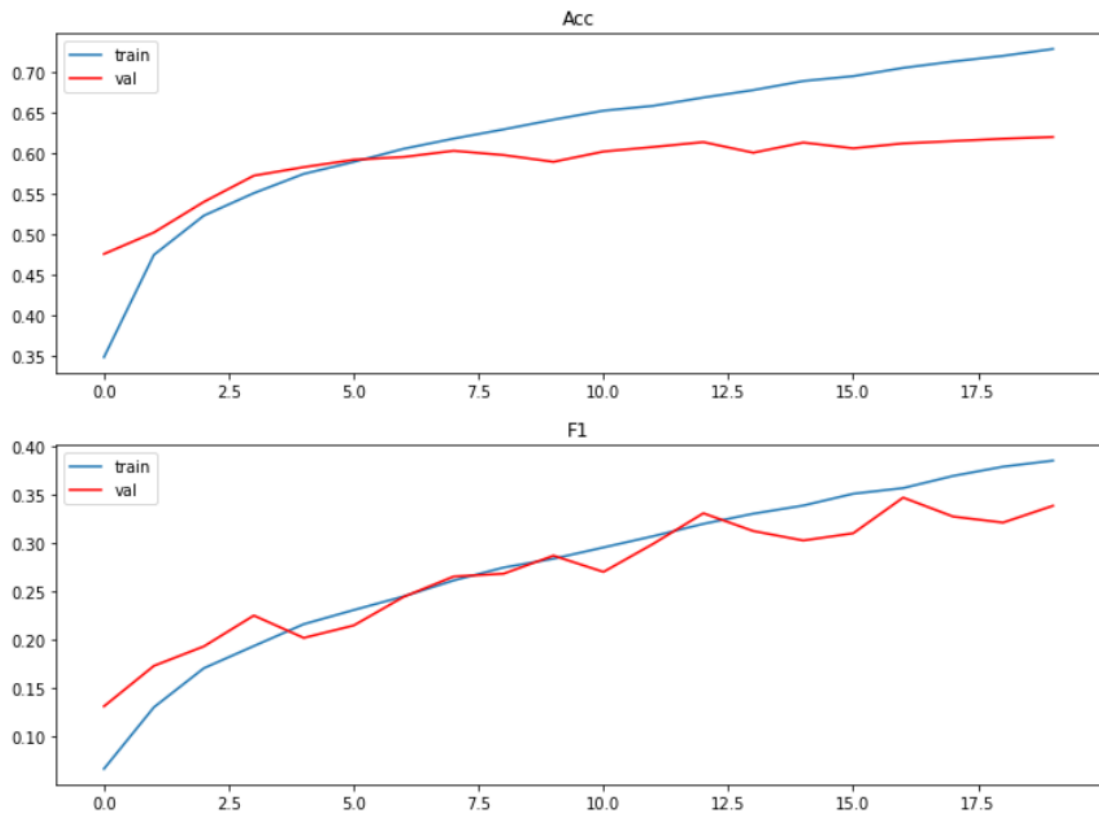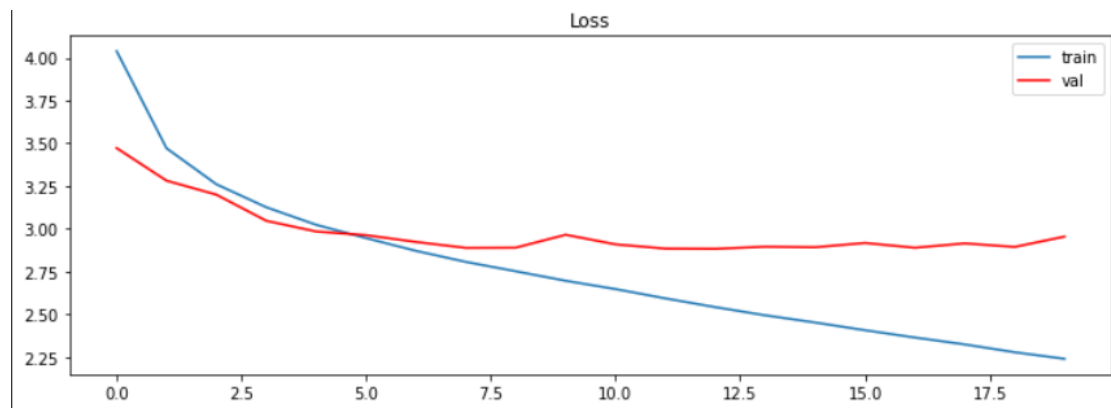
different with last version:

- 改用 vgg16 做 model pretrain
- 降低學習率

發現

- 當完成上面四個版本的時候
- 發現 Category Acc 最高的是 version 3 (ResNet18)，而 Attribute Acc 最高的則是 version 4 (VGG16)

Version 5 : VGG16 + AdamW with Weight_decay

- Kaggle Category : 0.62530
- Kaggle Attribute : 0.53728

Model

- vgg16
- ReLU()
- Linear(1000, 10) / Linear(1000, 15)
- 2 fully-connected layer

Loss and optimizer

- optimize function : AdamW
- learning rate : 1e-4
- weight_decay : 0.04
- scheduler : StepLR

```
criterion1, criterion2 = nn.CrossEntropyLoss(), nn.BCEWithLogitsLoss()
optimizer = torch.optim.AdamW(model.parameters(), lr=1e-4, weight_decay=0.04)
scheduler = optim.lr_scheduler.StepLR(optimizer, step_size=5, gamma=0.1)
```

Training

- Epoch : 20

```
===================================== Epoch 1 =====================================
Train Acc (Category): 0.338816 Train F1 (Attribute): 0.067251 Train Loss: 4.055553
  Val Acc (Category): 0.447540   Val F1 (Attribute): 0.133930   Val Loss: 3.566313
===================================== Epoch 2 =====================================
Train Acc (Category): 0.472322 Train F1 (Attribute): 0.128979 Train Loss: 3.491927
  Val Acc (Category): 0.533285   Val F1 (Attribute): 0.192010   Val Loss: 3.193482
===================================== Epoch 3 =====================================
Train Acc (Category): 0.516014 Train F1 (Attribute): 0.160600 Train Loss: 3.291405
  Val Acc (Category): 0.558611   Val F1 (Attribute): 0.166483   Val Loss: 3.135005
===================================== Epoch 4 =====================================
Train Acc (Category): 0.544127 Train F1 (Attribute): 0.187424 Train Loss: 3.156208
  Val Acc (Category): 0.552098   Val F1 (Attribute): 0.195957   Val Loss: 3.081568
===================================== Epoch 5 =====================================
Train Acc (Category): 0.562826 Train F1 (Attribute): 0.202584 Train Loss: 3.070285
  Val Acc (Category): 0.563676   Val F1 (Attribute): 0.234169   Val Loss: 3.050664
===================================== Epoch 6 =====================================
Train Acc (Category): 0.615804 Train F1 (Attribute): 0.256701 Train Loss: 2.819459
  Val Acc (Category): 0.617221   Val F1 (Attribute): 0.270113   Val Loss: 2.853034
===================================== Epoch 7 =====================================
Train Acc (Category): 0.633071 Train F1 (Attribute): 0.272028 Train Loss: 2.745959
  Val Acc (Category): 0.619754   Val F1 (Attribute): 0.278742   Val Loss: 2.831418
===================================== Epoch 8 =====================================
Train Acc (Category): 0.637547 Train F1 (Attribute): 0.276949 Train Loss: 2.716507
  Val Acc (Category): 0.619573   Val F1 (Attribute): 0.291260   Val Loss: 2.815017
===================================== Epoch 9 =====================================
Train Acc (Category): 0.645580 Train F1 (Attribute): 0.284011 Train Loss: 2.681915
  Val Acc (Category): 0.621382   Val F1 (Attribute): 0.290036   Val Loss: 2.811196
===================================== Epoch 10 =====================================
Train Acc (Category): 0.648880 Train F1 (Attribute): 0.290314 Train Loss: 2.652191
  Val Acc (Category): 0.624096   Val F1 (Attribute): 0.290175   Val Loss: 2.805309
```

```
================================= Epoch 11 =================================
Train Acc (Category): 0.659879 Train F1 (Attribute): 0.296555 Train Loss: 2.611313
  Val Acc (Category): 0.625543   Val F1 (Attribute): 0.299612   Val Loss: 2.798015
================================= Epoch 12 =================================
Train Acc (Category): 0.659751 Train F1 (Attribute): 0.298132 Train Loss: 2.603346
  Val Acc (Category): 0.627171   Val F1 (Attribute): 0.301632   Val Loss: 2.799521
================================= Epoch 13 =================================
Train Acc (Category): 0.660391 Train F1 (Attribute): 0.301283 Train Loss: 2.601506
  Val Acc (Category): 0.626447   Val F1 (Attribute): 0.302066   Val Loss: 2.797609
================================= Epoch 14 =================================
Train Acc (Category): 0.658907 Train F1 (Attribute): 0.300664 Train Loss: 2.601121
  Val Acc (Category): 0.628437   Val F1 (Attribute): 0.302518   Val Loss: 2.796652
================================= Epoch 15 =================================
Train Acc (Category): 0.662821 Train F1 (Attribute): 0.302421 Train Loss: 2.590678
  Val Acc (Category): 0.628075   Val F1 (Attribute): 0.301915   Val Loss: 2.796026
================================= Epoch 16 =================================
Train Acc (Category): 0.660902 Train F1 (Attribute): 0.302216 Train Loss: 2.591412
  Val Acc (Category): 0.628799   Val F1 (Attribute): 0.302548   Val Loss: 2.795660
================================= Epoch 17 =================================
Train Acc (Category): 0.662079 Train F1 (Attribute): 0.304417 Train Loss: 2.590003
  Val Acc (Category): 0.629703   Val F1 (Attribute): 0.302186   Val Loss: 2.795894
================================= Epoch 18 =================================
Train Acc (Category): 0.660135 Train F1 (Attribute): 0.302711 Train Loss: 2.594391
  Val Acc (Category): 0.628980   Val F1 (Attribute): 0.302669   Val Loss: 2.796013
================================= Epoch 19 =================================
Train Acc (Category): 0.663154 Train F1 (Attribute): 0.302799 Train Loss: 2.590350
  Val Acc (Category): 0.629703   Val F1 (Attribute): 0.302578   Val Loss: 2.796132
================================= Epoch 20 =================================
Train Acc (Category): 0.663972 Train F1 (Attribute): 0.304482 Train Loss: 2.594414
  Val Acc (Category): 0.629342   Val F1 (Attribute): 0.302379   Val Loss: 2.795649
```

Visualize
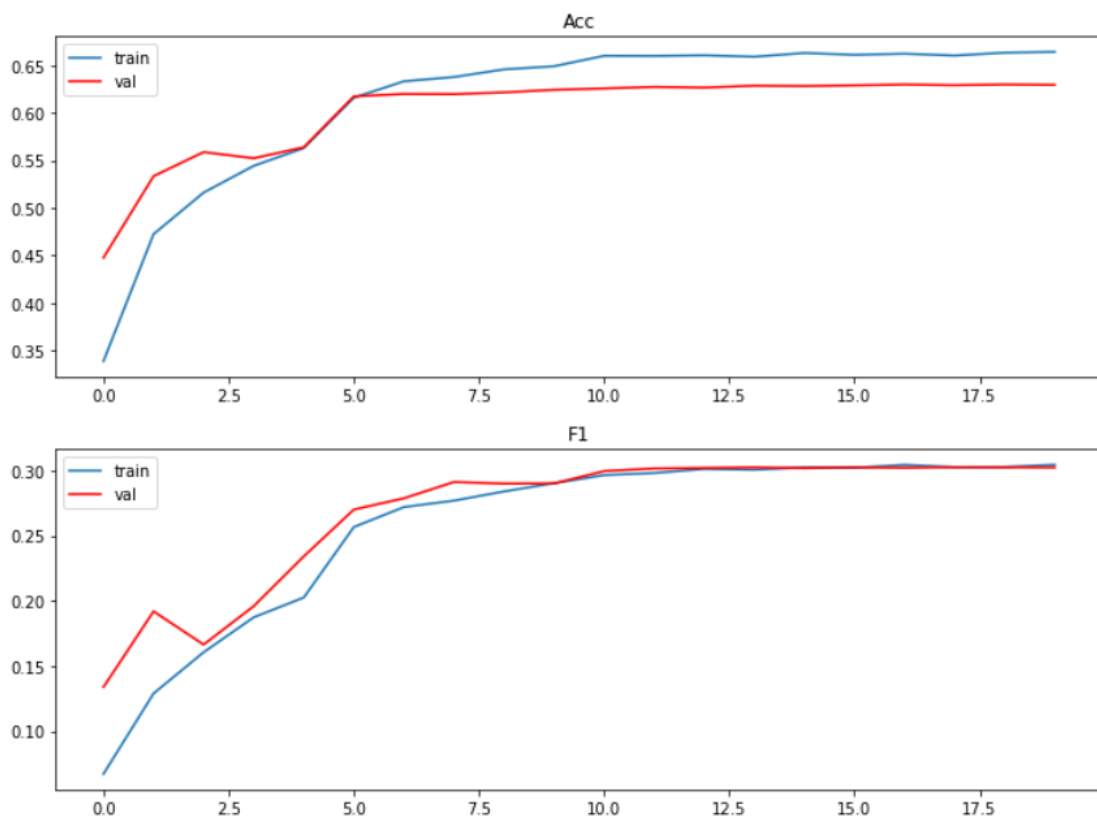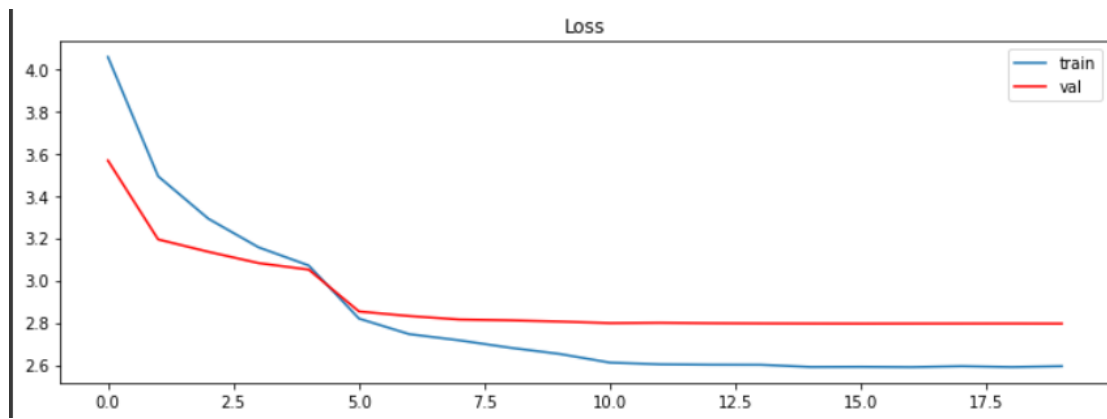
different with last version :

- 加入 ColorJitter
- 用 vgg16 做 model pretrain
- optimizer 改用 AdamW 並設定 weight_decay
- 加入 scheduler
- 模型 overfitting 情況改善