산업인공지능학과

Project _No3

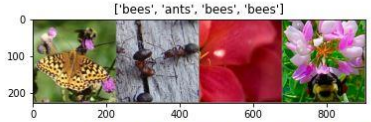
산업인공지능개론

2020254003

원형일

ResNet을 이용한 전이 학습

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
/usr/local/lib/python3.7/dist-packages/torch/utils/data/dataloader.py:477: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested max number of worker in current system is 2, which is smaller than what this DataLoader is goi
  cpuset_checked))
```




```
Downloading: "https://download.pytorch.org/models/resnet18-5c106cde.pth" to /root/.cache/torch/hub/checkpoints/resnet18-5c106cde.pth
100%  44.7M/44.7M [26:54<00:00, 29.0kB/s]

Epoch 0/24
----------
/usr/local/lib/python3.7/dist-packages/torch/optim/lr_scheduler.py:134: UserWarning: Detected call of `lr_scheduler.step()` before `optimizer.step()`. In PyTorch 1.1.0 and later, you should call them in the opposite order: `optimizer.step()` before `lr_
  "https://pytorch.org/docs/stable/optim.html#how-to-adjust-learning-rate", UserWarning)
train Loss: 0.4800 Acc: 0.7910
val Loss: 0.2900 Acc: 0.9020

Epoch 1/24
----------
train Loss: 0.5517 Acc: 0.7828
val Loss: 0.3707 Acc: 0.8301

Epoch 2/24
----------
train Loss: 0.6169 Acc: 0.7664
val Loss: 0.2542 Acc: 0.9216

Epoch 3/24
----------
train Loss: 0.4612 Acc: 0.8197
val Loss: 0.3379 Acc: 0.8889

Epoch 4/24
----------
train Loss: 0.7001 Acc: 0.7705
val Loss: 0.7688 Acc: 0.7451

Epoch 5/24
```

ResNet을 이용한 전이 학습

```
Epoch 5/24
----------
train Loss: 0.4214 Acc: 0.8484
val Loss: 0.4036 Acc: 0.8170

Epoch 6/24
----------
train Loss: 0.4019 Acc: 0.8525
val Loss: 0.2813 Acc: 0.9020

Epoch 7/24
----------
train Loss: 0.3124 Acc: 0.8689
val Loss: 0.2609 Acc: 0.9020

Epoch 8/24
----------
train Loss: 0.3492 Acc: 0.8443
val Loss: 0.2504 Acc: 0.9150

Epoch 9/24
----------
train Loss: 0.3145 Acc: 0.8607
val Loss: 0.2259 Acc: 0.9281

Epoch 10/24
----------
train Loss: 0.2486 Acc: 0.9139
val Loss: 0.2406 Acc: 0.9150

Epoch 11/24
----------
train Loss: 0.3602 Acc: 0.8320
val Loss: 0.2851 Acc: 0.9020

Epoch 12/24
----------
train Loss: 0.3660 Acc: 0.8361
val Loss: 0.2226 Acc: 0.9216

Epoch 13/24
----------
train Loss: 0.2989 Acc: 0.8852
val Loss: 0.2205 Acc: 0.9281

Epoch 14/24
----------
train Loss: 0.4316 Acc: 0.7992
val Loss: 0.2136 Acc: 0.9346

Epoch 15/24
----------
train Loss: 0.2712 Acc: 0.8893
val Loss: 0.2136 Acc: 0.9346

Epoch 16/24
----------
train Loss: 0.3071 Acc: 0.8648
val Loss: 0.2221 Acc: 0.9281

Epoch 17/24
----------
train Loss: 0.3061 Acc: 0.8607
val Loss: 0.2179 Acc: 0.9216

Epoch 18/24
----------
train Loss: 0.2854 Acc: 0.8770
val Loss: 0.2114 Acc: 0.9346

Epoch 19/24
----------
train Loss: 0.3875 Acc: 0.8361
val Loss: 0.2173 Acc: 0.9216

Epoch 20/24
----------
train Loss: 0.2368 Acc: 0.8893
val Loss: 0.2153 Acc: 0.9412
```

ResNet을 이용한 전이 학습

```
Epoch 21/24
----------
train Loss: 0.3284 Acc: 0.8484
val Loss: 0.2268 Acc: 0.9281

Epoch 22/24
----------
train Loss: 0.3690 Acc: 0.8361
val Loss: 0.2145 Acc: 0.9085

Epoch 23/24
----------
train Loss: 0.3341 Acc: 0.8402
val Loss: 0.2163 Acc: 0.9216

Epoch 24/24
----------
train Loss: 0.3030 Acc: 0.8852
val Loss: 0.2681 Acc: 0.8889

Training complete in 32m 49s
Best val Acc: 0.941176
```


```
Epoch 0/24
----------
train Loss: 0.6639 Acc: 0.6311
val Loss: 0.3646 Acc: 0.8366
```

ResNet을 이용한 전이 학습

```
Epoch 1/24
----------
train Loss: 0.5637 Acc: 0.7582
val Loss: 0.2026 Acc: 0.9346

Epoch 2/24
----------
train Loss: 0.4414 Acc: 0.7828
val Loss: 0.3398 Acc: 0.8627

Epoch 3/24
----------
train Loss: 0.6353 Acc: 0.7336
val Loss: 0.4689 Acc: 0.8301

Epoch 4/24
----------
train Loss: 0.3456 Acc: 0.8566
val Loss: 0.3033 Acc: 0.8954

Epoch 5/24
----------
train Loss: 0.3736 Acc: 0.8361
val Loss: 0.2114 Acc: 0.9346

Epoch 6/24
----------
train Loss: 0.4252 Acc: 0.8361
val Loss: 0.2293 Acc: 0.9281

Epoch 7/24
----------
train Loss: 0.3859 Acc: 0.8320
val Loss: 0.1905 Acc: 0.9477

Epoch 8/24
----------
train Loss: 0.4760 Acc: 0.7951
val Loss: 0.1910 Acc: 0.9412

Epoch 9/24
----------
train Loss: 0.4052 Acc: 0.8033
val Loss: 0.1936 Acc: 0.9281

Epoch 10/24
----------
train Loss: 0.4346 Acc: 0.7910
val Loss: 0.1934 Acc: 0.9346

Epoch 11/24
----------
train Loss: 0.2949 Acc: 0.8811
val Loss: 0.1875 Acc: 0.9542

Epoch 12/24
----------
train Loss: 0.3852 Acc: 0.8443
val Loss: 0.1863 Acc: 0.9412

Epoch 13/24
----------
train Loss: 0.3998 Acc: 0.8033
val Loss: 0.1944 Acc: 0.9477

Epoch 14/24
----------
train Loss: 0.2937 Acc: 0.8566
val Loss: 0.1799 Acc: 0.9542

Epoch 15/24
----------
train Loss: 0.3568 Acc: 0.8320
val Loss: 0.1756 Acc: 0.9608

Epoch 16/24
----------
train Loss: 0.4197 Acc: 0.8115
val Loss: 0.1840 Acc: 0.9412
```

ResNet을 이용한 전이 학습

```
Epoch 17/24
----------
train Loss: 0.3367 Acc: 0.8607
val Loss: 0.1877 Acc: 0.9281

Epoch 18/24
----------
train Loss: 0.3688 Acc: 0.8238
val Loss: 0.2024 Acc: 0.9477

Epoch 19/24
----------
train Loss: 0.3823 Acc: 0.8361
val Loss: 0.2028 Acc: 0.9281

Epoch 20/24
----------
train Loss: 0.3317 Acc: 0.8402
val Loss: 0.1893 Acc: 0.9412

Epoch 21/24
----------
train Loss: 0.2788 Acc: 0.8730
val Loss: 0.1844 Acc: 0.9412

Epoch 22/24
----------
train Loss: 0.3371 Acc: 0.8361
val Loss: 0.1956 Acc: 0.9346

Epoch 23/24
----------
train Loss: 0.3202 Acc: 0.8770
val Loss: 0.2134 Acc: 0.9346

Epoch 24/24
----------
train Loss: 0.3430 Acc: 0.8607
val Loss: 0.2389 Acc: 0.9150
```

predicted: bees

predicted: bees

predicted: ants

predicted: ants

predicted: bees

predicted: bees