树叶分类竞赛实验记录

train_simple（ResNet+GoogLeNet）：

```
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
python train_simple.py
Epoch 1: train_loss=4.9685, train_acc=0.038, val_acc=0.056
Epoch 2: train_loss=4.3430, train_acc=0.087, val_acc=0.109
Epoch 3: train_loss=3.6593, train_acc=0.157, val_acc=0.182
Epoch 4: train_loss=3.0186, train_acc=0.250, val_acc=0.271
Epoch 5: train_loss=2.4815, train_acc=0.355, val_acc=0.303
Epoch 6: train_loss=2.0836, train_acc=0.433, val_acc=0.365
Epoch 7: train_loss=1.7373, train_acc=0.510, val_acc=0.357
Epoch 8: train_loss=1.5177, train_acc=0.561, val_acc=0.311
Epoch 9: train_loss=1.4215, train_acc=0.581, val_acc=0.250
Epoch 10: train_loss=1.3158, train_acc=0.611, val_acc=0.249
Epoch 11: train_loss=1.2518, train_acc=0.630, val_acc=0.376
Epoch 12: train_loss=1.1662, train_acc=0.651, val_acc=0.350
Epoch 13: train_loss=1.0976, train_acc=0.665, val_acc=0.406
Epoch 14: train_loss=1.0525, train_acc=0.681, val_acc=0.261
Epoch 15: train_loss=0.9843, train_acc=0.706, val_acc=0.371
Epoch 16: train_loss=0.9410, train_acc=0.715, val_acc=0.279
Epoch 17: train_loss=0.9188, train_acc=0.721, val_acc=0.217
Epoch 18: train_loss=0.8485, train_acc=0.742, val_acc=0.508
Epoch 19: train_loss=0.8066, train_acc=0.754, val_acc=0.151
Epoch 20: train_loss=0.7720, train_acc=0.765, val_acc=0.191
Epoch 21: train_loss=0.7259, train_acc=0.779, val_acc=0.495
Epoch 22: train_loss=0.6713, train_acc=0.796, val_acc=0.466
Epoch 23: train_loss=0.6157, train_acc=0.814, val_acc=0.316
Epoch 24: train_loss=0.5320, train_acc=0.834, val_acc=0.278
Epoch 25: train_loss=0.5099, train_acc=0.841, val_acc=0.233
Epoch 26: train_loss=0.4372, train_acc=0.863, val_acc=0.321
Epoch 27: train_loss=0.4236, train_acc=0.873, val_acc=0.169
Epoch 28: train_loss=0.4087, train_acc=0.876, val_acc=0.277
验证集10轮无提升，提前结束训练。
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
```

train（ResNet+GoogLeNet+NiN）：

```
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
python train.py
Epoch 1: train_loss=5.0871, train_acc=0.017, val_acc=0.043
Epoch 2: train_loss=4.8331, train_acc=0.066, val_acc=0.091
Epoch 3: train_loss=4.5378, train_acc=0.122, val_acc=0.132
Epoch 4: train_loss=4.1651, train_acc=0.190, val_acc=0.168
Epoch 5: train_loss=3.7830, train_acc=0.255, val_acc=0.205
Epoch 6: train_loss=3.4110, train_acc=0.324, val_acc=0.234
Epoch 7: train_loss=3.0522, train_acc=0.408, val_acc=0.301
Epoch 8: train_loss=2.6937, train_acc=0.490, val_acc=0.363
Epoch 9: train_loss=2.3401, train_acc=0.557, val_acc=0.362
Epoch 10: train_loss=1.9899, train_acc=0.618, val_acc=0.304
Epoch 11: train_loss=1.7147, train_acc=0.652, val_acc=0.294
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Epoch 12: train_loss=1.5065, train_acc=0.682, val_acc=0.311
Epoch 13: train_loss=1.3380, train_acc=0.705, val_acc=0.201
Epoch 14: train_loss=1.2038, train_acc=0.721, val_acc=0.229
Epoch 15: train_loss=1.1104, train_acc=0.726, val_acc=0.245
Epoch 16: train_loss=0.9902, train_acc=0.746, val_acc=0.392
Epoch 17: train_loss=0.9416, train_acc=0.747, val_acc=0.166
Epoch 18: train_loss=0.8511, train_acc=0.764, val_acc=0.122
Epoch 19: train_loss=0.7957, train_acc=0.773, val_acc=0.206
Epoch 20: train_loss=0.7396, train_acc=0.784, val_acc=0.314
Epoch 21: train_loss=0.6711, train_acc=0.805, val_acc=0.150
Epoch 22: train_loss=0.6267, train_acc=0.814, val_acc=0.364
Epoch 23: train_loss=0.6023, train_acc=0.820, val_acc=0.328
Epoch 24: train_loss=0.5319, train_acc=0.839, val_acc=0.536
Epoch 25: train_loss=0.4342, train_acc=0.865, val_acc=0.447
Epoch 26: train_loss=0.4362, train_acc=0.867, val_acc=0.447
Epoch 27: train_loss=0.3617, train_acc=0.885, val_acc=0.177
Epoch 28: train_loss=0.2884, train_acc=0.911, val_acc=0.336
Epoch 29: train_loss=0.2739, train_acc=0.915, val_acc=0.211
Epoch 30: train_loss=0.2033, train_acc=0.936, val_acc=0.410
Epoch 31: train_loss=0.1746, train_acc=0.945, val_acc=0.271
Epoch 32: train_loss=0.1530, train_acc=0.950, val_acc=0.221
Epoch 33: train_loss=0.1382, train_acc=0.955, val_acc=0.403
Epoch 34: train_loss=0.1521, train_acc=0.951, val_acc=0.595
Epoch 35: train_loss=0.1231, train_acc=0.959, val_acc=0.383
Epoch 36: train_loss=0.1050, train_acc=0.966, val_acc=0.493
Epoch 37: train_loss=0.1039, train_acc=0.966, val_acc=0.242
Epoch 38: train_loss=0.1233, train_acc=0.960, val_acc=0.431
Epoch 39: train_loss=0.1288, train_acc=0.959, val_acc=0.494
Epoch 40: train_loss=0.1173, train_acc=0.963, val_acc=0.307
Epoch 41: train_loss=0.0808, train_acc=0.974, val_acc=0.656
Epoch 42: train_loss=0.0663, train_acc=0.976, val_acc=0.360
Epoch 43: train_loss=0.0620, train_acc=0.979, val_acc=0.194
Epoch 44: train_loss=0.0499, train_acc=0.982, val_acc=0.725
Epoch 45: train_loss=0.0503, train_acc=0.982, val_acc=0.526
Epoch 46: train_loss=0.0514, train_acc=0.983, val_acc=0.694
Epoch 47: train_loss=0.0767, train_acc=0.975, val_acc=0.333
Epoch 48: train_loss=0.0736, train_acc=0.975, val_acc=0.679
Epoch 49: train_loss=0.0930, train_acc=0.971, val_acc=0.665
Epoch 50: train_loss=0.0788, train_acc=0.974, val_acc=0.568
Epoch 51: train_loss=0.0586, train_acc=0.980, val_acc=0.742
Epoch 52: train_loss=0.0624, train_acc=0.980, val_acc=0.391
Epoch 53: train_loss=0.0319, train_acc=0.988, val_acc=0.773
Epoch 54: train_loss=0.0230, train_acc=0.990, val_acc=0.767
Epoch 55: train_loss=0.0165, train_acc=0.992, val_acc=0.816
Epoch 56: train_loss=0.0144, train_acc=0.992, val_acc=0.813
Epoch 57: train_loss=0.0132, train_acc=0.994, val_acc=0.820
Epoch 58: train_loss=0.0129, train_acc=0.993, val_acc=0.763
Epoch 59: train_loss=0.0186, train_acc=0.991, val_acc=0.713
Epoch 60: train_loss=0.0189, train_acc=0.991, val_acc=0.762
Epoch 61: train_loss=0.0144, train_acc=0.992, val_acc=0.813
Epoch 62: train_loss=0.0127, train_acc=0.993, val_acc=0.612
Epoch 63: train_loss=0.0182, train_acc=0.991, val_acc=0.463
Epoch 64: train_loss=0.0137, train_acc=0.993, val_acc=0.757
Epoch 65: train_loss=0.0122, train_acc=0.993, val_acc=0.814
Epoch 66: train_loss=0.0121, train_acc=0.993, val_acc=0.782
Epoch 67: train_loss=0.0104, train_acc=0.994, val_acc=0.818
```

```
验证集10轮无提升，提前结束训练。
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
```

ResNet18：

```
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
python train.py
Sequential output shape: torch.Size([1, 64, 56, 56])
Sequential output shape: torch.Size([1, 64, 56, 56])
Sequential output shape: torch.Size([1, 128, 28, 28])
Sequential output shape: torch.Size([1, 256, 14, 14])
Sequential output shape: torch.Size([1, 512, 7, 7])
AdaptiveAvgPool2d output shape: torch.Size([1, 512, 1, 1])
Flatten output shape: torch.Size([1, 512])
Linear output shape: torch.Size([1, 10])
Epoch 1: train_loss=4.7770, train_acc=0.058, val_acc=0.083
Epoch 2: train_loss=3.8128, train_acc=0.171, val_acc=0.204
Epoch 3: train_loss=2.9402, train_acc=0.329, val_acc=0.350
Epoch 4: train_loss=2.1960, train_acc=0.500, val_acc=0.435
Epoch 5: train_loss=1.5859, train_acc=0.642, val_acc=0.478
Epoch 6: train_loss=1.1128, train_acc=0.751, val_acc=0.526
Epoch 7: train_loss=0.7661, train_acc=0.834, val_acc=0.524
Epoch 8: train_loss=0.5713, train_acc=0.876, val_acc=0.492
Epoch 9: train_loss=0.4862, train_acc=0.886, val_acc=0.524
Epoch 10: train_loss=0.4935, train_acc=0.873, val_acc=0.425
Epoch 11: train_loss=0.5196, train_acc=0.859, val_acc=0.430
Epoch 12: train_loss=0.5388, train_acc=0.846, val_acc=0.419
Epoch 13: train_loss=0.5995, train_acc=0.821, val_acc=0.349
Epoch 14: train_loss=0.5785, train_acc=0.827, val_acc=0.425
Epoch 15: train_loss=0.6007, train_acc=0.819, val_acc=0.215
Epoch 16: train_loss=0.5836, train_acc=0.817, val_acc=0.438
验证集10轮无提升，提前结束训练。
root@autodl-container-15e54bbd30-6a446cff:~/autodl-tmp/classify-leaves-contest#
```

ResNet50_pretrained（引自[SHENZHENYI/Classify-Leaves-Kaggle-MuLi-d2l-course: one competition held by d2l course]，感谢这位同学的分享！）：

```
fold 4 epoch 38 train_loss 0.5481860692324076 val_loss 0.1382267272806373
val_accu tensor(0.9771, device='cuda:0') train_accu tensor(0.9849,
device='cuda:0') train time 13.151082992553711 val time 1.6090893745422363 lr[0]
4.7701862904458604e-05
fold 4 epoch 39 train_loss 0.5439505825656991 val_loss 0.14086973474457345
val_accu tensor(0.9782, device='cuda:0') train_accu tensor(0.9848,
device='cuda:0') train time 13.28351902961731 val time 1.6027367115020752 lr[0]
4.2215078301577165e-05
Stored a new best model in ./
fold 4 epoch 40 train_loss 0.5451025305616803 val_loss 0.1402504717738464
val_accu tensor(0.9766, device='cuda:0') train_accu tensor(0.9833,
device='cuda:0') train time 13.329397916793823 val time 1.6123321056365967 lr[0]
3.7183270615968625e-05
```

```
fold 4 epoch 41 train_loss 0.5390163268324589 val_loss 0.13799067406818785
val_accu tensor(0.9771, device='cuda:0') train_accu tensor(0.9842,
device='cuda:0') train time 13.07641887664795 val time 1.6178343296051025 lr[0]
3.262629809375406e-05
fold 4 epoch 42 train_loss 0.5434747620701269 val_loss 0.13926752406204568
val_accu tensor(0.9771, device='cuda:0') train_accu tensor(0.9856,
device='cuda:0') train time 13.28292965888977 val time 1.6074345111846924 lr[0]
2.856214502359579e-05
fold 4 epoch 43 train_loss 0.5421962031370687 val_loss 0.14447612225495535
val_accu tensor(0.9777, device='cuda:0') train_accu tensor(0.9850,
device='cuda:0') train time 12.325379610061646 val time 1.612342357635498 lr[0]
2.5006850760926762e-05
fold 4 epoch 44 train_loss 0.5393940421171063 val_loss 0.1391967105968245
val_accu tensor(0.9790, device='cuda:0') train_accu tensor(0.9861,
device='cuda:0') train time 13.107446432113647 val time 1.6021335124969482 lr[0]
2.1974446427942407e-05
Stored a new best model in ./
fold 4 epoch 45 train_loss 0.5429157129281473 val_loss 0.13583181939762215
val_accu tensor(0.9779, device='cuda:0') train_accu tensor(0.9863,
device='cuda:0') train time 13.02602767944336 val time 1.5725696086883545 lr[0]
1.9476899539171217e-05
fold 4 epoch 46 train_loss 0.5419856757576289 val_loss 0.1381339403832781
val_accu tensor(0.9785, device='cuda:0') train_accu tensor(0.9849,
device='cuda:0') train time 13.161810398101807 val time 1.6024792194366455 lr[0]
1.7524066771162496e-05
fold 4 epoch 47 train_loss 0.5404212707775649 val_loss 0.14085381169771327
val_accu tensor(0.9774, device='cuda:0') train_accu tensor(0.9840,
device='cuda:0') train time 13.11550498008728 val time 1.5865793228149414 lr[0]
1.6123655062687184e-05
fold 4 epoch 48 train_loss 0.5395058725338315 val_loss 0.13817753443687125
val_accu tensor(0.9771, device='cuda:0') train_accu tensor(0.9845,
device='cuda:0') train time 12.950674295425415 val time 1.6120119094848633 lr[0]
1.5281191198971367e-05
fold 4 epoch 49 train_loss 0.5421179946853605 val_loss 0.1422205625166153
val_accu tensor(0.9766, device='cuda:0') train_accu tensor(0.9844,
device='cuda:0') train time 13.280203104019165 val time 1.5808517932891846 lr[0]
1.4999999999999999e-05
test cvs is saved
Traceback (most recent call last):
  File "/root/autodl-tmp/ResNet50_leaves.py", line 458, in <module>
    for i in range(cvss_label.shape[1]):
                   ~~~~~~~~~~~~~~~~~^^^
IndexError: tuple index out of range
root@autodl-container-9fce4eaed9-35e864f9:~/autodl-tmp#
```