开始将JPG图像转换为PT文件...

完成转换，共处理 0 张图像

使用设备: cpu

训练集大小: 2450, 测试集大小: 614

第 1 次尝试

选择优化器: SGD, 学习率: 0.0002

C:\Users\Young\anaconda3\Lib\site-packages\torchvision\models\\_utils.py:208: UserWarning: The parameter 'pretrained' is deprecated since 0.13 and may be removed in the future, please use 'weights' instead.

warnings.warn(

C:\Users\Young\anaconda3\Lib\site-packages\torchvision\models\\_utils.py:223: UserWarning: Arguments other than a weight enum or `None` for 'weights' are deprecated since 0.13 and may be removed in the future. The current behavior is equivalent to passing `weights=ResNet18\_Weights.IMAGENET1K\_V1`. You can also use `weights=ResNet18\_Weights.DEFAULT` to get the most up-to-date weights.

warnings.warn(msg)

Epoch 0/9

----------

train Loss: 1.0818 Acc: 0.4518

val Loss: 1.0393 Acc: 0.4837

Epoch 1/9

----------

train Loss: 1.0214 Acc: 0.5216

val Loss: 0.9917 Acc: 0.5326

Epoch 2/9

----------

train Loss: 0.9800 Acc: 0.5759

val Loss: 0.9489 Acc: 0.5847

Epoch 3/9

----------

train Loss: 0.9433 Acc: 0.6098

val Loss: 0.9099 Acc: 0.6205

Epoch 4/9

----------

train Loss: 0.9115 Acc: 0.6359

val Loss: 0.8775 Acc: 0.6564

Epoch 5/9

----------

train Loss: 0.8779 Acc: 0.6649

val Loss: 0.8478 Acc: 0.6678

Epoch 6/9

----------

train Loss: 0.8504 Acc: 0.6849

val Loss: 0.8198 Acc: 0.6873

Epoch 7/9

----------

train Loss: 0.8315 Acc: 0.6992

val Loss: 0.8180 Acc: 0.6922

Epoch 8/9

----------

train Loss: 0.8300 Acc: 0.6967

val Loss: 0.8150 Acc: 0.7020

Epoch 9/9

----------

train Loss: 0.8279 Acc: 0.7069

val Loss: 0.8142 Acc: 0.6840

训练完成，耗时 30m 18s

最佳验证准确率: 0.701954

第 2 次尝试

选择优化器: SGD, 学习率: 0.002

Epoch 0/9

----------

train Loss: 0.8730 Acc: 0.6600

val Loss: 0.7333 Acc: 0.7394

Epoch 1/9

----------

train Loss: 0.6832 Acc: 0.7649

val Loss: 0.6043 Acc: 0.7866

Epoch 2/9

----------

train Loss: 0.5880 Acc: 0.8045

val Loss: 0.5265 Acc: 0.8420

Epoch 3/9

----------

train Loss: 0.5316 Acc: 0.8180

val Loss: 0.4863 Acc: 0.8518

Epoch 4/9

----------

train Loss: 0.4989 Acc: 0.8282

val Loss: 0.4548 Acc: 0.8469

Epoch 5/9

----------

train Loss: 0.4752 Acc: 0.8343

val Loss: 0.4355 Acc: 0.8469

Epoch 6/9

----------

train Loss: 0.4452 Acc: 0.8502

val Loss: 0.4087 Acc: 0.8616

Epoch 7/9

----------

train Loss: 0.4370 Acc: 0.8478

val Loss: 0.4053 Acc: 0.8648

Epoch 8/9

----------

train Loss: 0.4326 Acc: 0.8469

val Loss: 0.4052 Acc: 0.8681

Epoch 9/9

----------

train Loss: 0.4358 Acc: 0.8465

val Loss: 0.4025 Acc: 0.8664

训练完成，耗时 25m 40s

最佳验证准确率: 0.868078

第 3 次尝试

选择优化器: SGD, 学习率: 0.02

Epoch 0/9

----------

train Loss: 0.7163 Acc: 0.7029

val Loss: 0.6835 Acc: 0.7117

Epoch 1/9

----------

train Loss: 0.4884 Acc: 0.8012

val Loss: 0.3197 Acc: 0.8697

Epoch 2/9

----------

train Loss: 0.4077 Acc: 0.8318

val Loss: 0.3301 Acc: 0.8697

Epoch 3/9

----------

train Loss: 0.3765 Acc: 0.8522

val Loss: 0.3172 Acc: 0.8713

Epoch 4/9

----------

train Loss: 0.3373 Acc: 0.8649

val Loss: 0.4293 Acc: 0.8094

Epoch 5/9

----------

train Loss: 0.3194 Acc: 0.8718

val Loss: 0.3122 Acc: 0.8779

Epoch 6/9

----------

train Loss: 0.2955 Acc: 0.8829

val Loss: 0.2448 Acc: 0.8990

Epoch 7/9

----------

train Loss: 0.2596 Acc: 0.9049

val Loss: 0.2442 Acc: 0.9007

Epoch 8/9

----------

train Loss: 0.2636 Acc: 0.8980

val Loss: 0.2422 Acc: 0.9007

Epoch 9/9

----------

train Loss: 0.2574 Acc: 0.8959

val Loss: 0.2420 Acc: 0.8958

训练完成，耗时 10m 0s

最佳验证准确率: 0.900651

第 4 次尝试

选择优化器: Adam, 学习率: 0.0002

Epoch 0/9

----------

train Loss: 1.0703 Acc: 0.4498

val Loss: 0.8777 Acc: 0.6124

Epoch 1/9

----------

train Loss: 0.8012 Acc: 0.6963

val Loss: 0.6920 Acc: 0.7590

Epoch 2/9

----------

train Loss: 0.6607 Acc: 0.7727

val Loss: 0.5848 Acc: 0.8192

Epoch 3/9

----------

train Loss: 0.5808 Acc: 0.8029

val Loss: 0.5187 Acc: 0.8371

Epoch 4/9

----------

train Loss: 0.5260 Acc: 0.8180

val Loss: 0.4759 Acc: 0.8371

Epoch 5/9

----------

train Loss: 0.4911 Acc: 0.8355

val Loss: 0.4449 Acc: 0.8616

Epoch 6/9

----------

train Loss: 0.4622 Acc: 0.8371

val Loss: 0.4201 Acc: 0.8697

Epoch 7/9

----------

train Loss: 0.4494 Acc: 0.8518

val Loss: 0.4180 Acc: 0.8697

Epoch 8/9

----------

train Loss: 0.4481 Acc: 0.8469

val Loss: 0.4154 Acc: 0.8681

Epoch 9/9

----------

train Loss: 0.4465 Acc: 0.8461

val Loss: 0.4141 Acc: 0.8697

训练完成，耗时 24m 19s

最佳验证准确率: 0.869707

第 5 次尝试

选择优化器: Adam, 学习率: 0.002

Epoch 0/9

----------

train Loss: 0.6106 Acc: 0.7478

val Loss: 0.3691 Acc: 0.8681

Epoch 1/9

----------

train Loss: 0.3858 Acc: 0.8433

val Loss: 0.3091 Acc: 0.8844

Epoch 2/9

----------

train Loss: 0.3581 Acc: 0.8567

val Loss: 0.2863 Acc: 0.8876

Epoch 3/9

----------

train Loss: 0.3127 Acc: 0.8784

val Loss: 0.2682 Acc: 0.8909

Epoch 4/9

----------

train Loss: 0.3109 Acc: 0.8690

val Loss: 0.2738 Acc: 0.8941

Epoch 5/9

----------

train Loss: 0.2865 Acc: 0.8865

val Loss: 0.2681 Acc: 0.8958

Epoch 6/9

----------

train Loss: 0.2774 Acc: 0.8878

val Loss: 0.2660 Acc: 0.8990

Epoch 7/9

----------

train Loss: 0.2618 Acc: 0.8988

val Loss: 0.2523 Acc: 0.8990

Epoch 8/9

----------

train Loss: 0.2479 Acc: 0.9057

val Loss: 0.2467 Acc: 0.9007

Epoch 9/9

----------

train Loss: 0.2417 Acc: 0.9082

val Loss: 0.2494 Acc: 0.8974

训练完成，耗时 31m 46s

最佳验证准确率: 0.900651

第 6 次尝试

选择优化器: Adam, 学习率: 0.02

Epoch 0/9

----------

train Loss: 1.5944 Acc: 0.6869

val Loss: 0.3331 Acc: 0.8811

Epoch 1/9

----------

train Loss: 0.4134 Acc: 0.8506

val Loss: 0.2689 Acc: 0.8925

Epoch 2/9

----------

train Loss: 0.5038 Acc: 0.8318

val Loss: 0.2969 Acc: 0.8909

Epoch 3/9

----------

train Loss: 0.4518 Acc: 0.8555

val Loss: 0.6452 Acc: 0.7948

Epoch 4/9

----------

train Loss: 0.3378 Acc: 0.8857

val Loss: 0.2810 Acc: 0.8958

Epoch 5/9

----------

train Loss: 0.3762 Acc: 0.8755

val Loss: 0.4110 Acc: 0.8534

Epoch 6/9

----------

train Loss: 0.5881 Acc: 0.8404

val Loss: 0.4826 Acc: 0.8779

Epoch 7/9

----------

train Loss: 0.2832 Acc: 0.9078

val Loss: 0.3410 Acc: 0.8909

Epoch 8/9

----------

train Loss: 0.2400 Acc: 0.9245

val Loss: 0.3196 Acc: 0.9023

Epoch 9/9

----------

train Loss: 0.2293 Acc: 0.9184

val Loss: 0.2961 Acc: 0.9137

训练完成，耗时 31m 46s

最佳验证准确率: 0.913681

第 7 次尝试

选择优化器: AdamW, 学习率: 0.0002

Epoch 0/9

----------

train Loss: 1.0380 Acc: 0.4653

val Loss: 0.8671 Acc: 0.6336

Epoch 1/9

----------

train Loss: 0.7739 Acc: 0.7110

val Loss: 0.6754 Acc: 0.7818

Epoch 2/9

----------

train Loss: 0.6435 Acc: 0.7845

val Loss: 0.5669 Acc: 0.8306

Epoch 3/9

----------

train Loss: 0.5682 Acc: 0.8118

val Loss: 0.5106 Acc: 0.8436

Epoch 4/9

----------

train Loss: 0.5250 Acc: 0.8176

val Loss: 0.4665 Acc: 0.8502

Epoch 5/9

----------

train Loss: 0.4935 Acc: 0.8224

val Loss: 0.4416 Acc: 0.8599

Epoch 6/9

----------

train Loss: 0.4535 Acc: 0.8400

val Loss: 0.4142 Acc: 0.8616

Epoch 7/9

----------

train Loss: 0.4403 Acc: 0.8547

val Loss: 0.4111 Acc: 0.8648

Epoch 8/9

----------

train Loss: 0.4430 Acc: 0.8416

val Loss: 0.4074 Acc: 0.8664

Epoch 9/9

----------

train Loss: 0.4374 Acc: 0.8416

val Loss: 0.4059 Acc: 0.8583

训练完成，耗时 31m 53s

最佳验证准确率: 0.866450

第 8 次尝试

选择优化器: AdamW, 学习率: 0.002

Epoch 0/9

----------

train Loss: 0.6137 Acc: 0.7482

val Loss: 0.3857 Acc: 0.8713

Epoch 1/9

----------

train Loss: 0.4034 Acc: 0.8416

val Loss: 0.3361 Acc: 0.8664

Epoch 2/9

----------

train Loss: 0.3594 Acc: 0.8531

val Loss: 0.2949 Acc: 0.8844

Epoch 3/9

----------

train Loss: 0.3464 Acc: 0.8673

val Loss: 0.2806 Acc: 0.8876

Epoch 4/9

----------

train Loss: 0.3006 Acc: 0.8808

val Loss: 0.2757 Acc: 0.8876

Epoch 5/9

----------

train Loss: 0.2881 Acc: 0.8869

val Loss: 0.2703 Acc: 0.8909

Epoch 6/9

----------

train Loss: 0.2970 Acc: 0.8788

val Loss: 0.2459 Acc: 0.8941

Epoch 7/9

----------

train Loss: 0.2480 Acc: 0.9029

val Loss: 0.2418 Acc: 0.9039

Epoch 8/9

----------

train Loss: 0.2519 Acc: 0.9000

val Loss: 0.2421 Acc: 0.9007

Epoch 9/9

----------

train Loss: 0.2506 Acc: 0.9024

val Loss: 0.2451 Acc: 0.8958

训练完成，耗时 36m 31s

最佳验证准确率: 0.903909

第 9 次尝试

选择优化器: AdamW, 学习率: 0.02

Epoch 0/9

----------

train Loss: 0.9646 Acc: 0.7188

val Loss: 0.4772 Acc: 0.8420

Epoch 1/9

----------

train Loss: 0.6707 Acc: 0.8045

val Loss: 0.3633 Acc: 0.8811

Epoch 2/9

----------

train Loss: 0.4764 Acc: 0.8437

val Loss: 0.3800 Acc: 0.8811

Epoch 3/9

----------

train Loss: 0.3224 Acc: 0.8861

val Loss: 0.3360 Acc: 0.8827

Epoch 4/9

----------

train Loss: 0.4313 Acc: 0.8567

val Loss: 0.3386 Acc: 0.8779

Epoch 5/9

----------

train Loss: 0.5315 Acc: 0.8567

val Loss: 0.3926 Acc: 0.8909

Epoch 6/9

----------

train Loss: 0.6713 Acc: 0.8310

val Loss: 0.4493 Acc: 0.8827

Epoch 7/9

----------

train Loss: 0.3000 Acc: 0.9041

val Loss: 0.3185 Acc: 0.9007

Epoch 8/9

----------

train Loss: 0.2807 Acc: 0.9114

val Loss: 0.3064 Acc: 0.9055

Epoch 9/9

----------

train Loss: 0.2588 Acc: 0.9131

val Loss: 0.2892 Acc: 0.9153

训练完成，耗时 342m 12s

最佳验证准确率: 0.915309

最佳验证准确率: 0.9153

最佳优化器: AdamW

最佳学习率: 0.02

评估结果:

准确率: 0.9153

精确率: 0.9147

召回率: 0.9153

F1分数: 0.9150