

SimCLR-Based Potato Disease Classification Model

Load and transform potato disease images using PyTorch's `ImageFolder`.

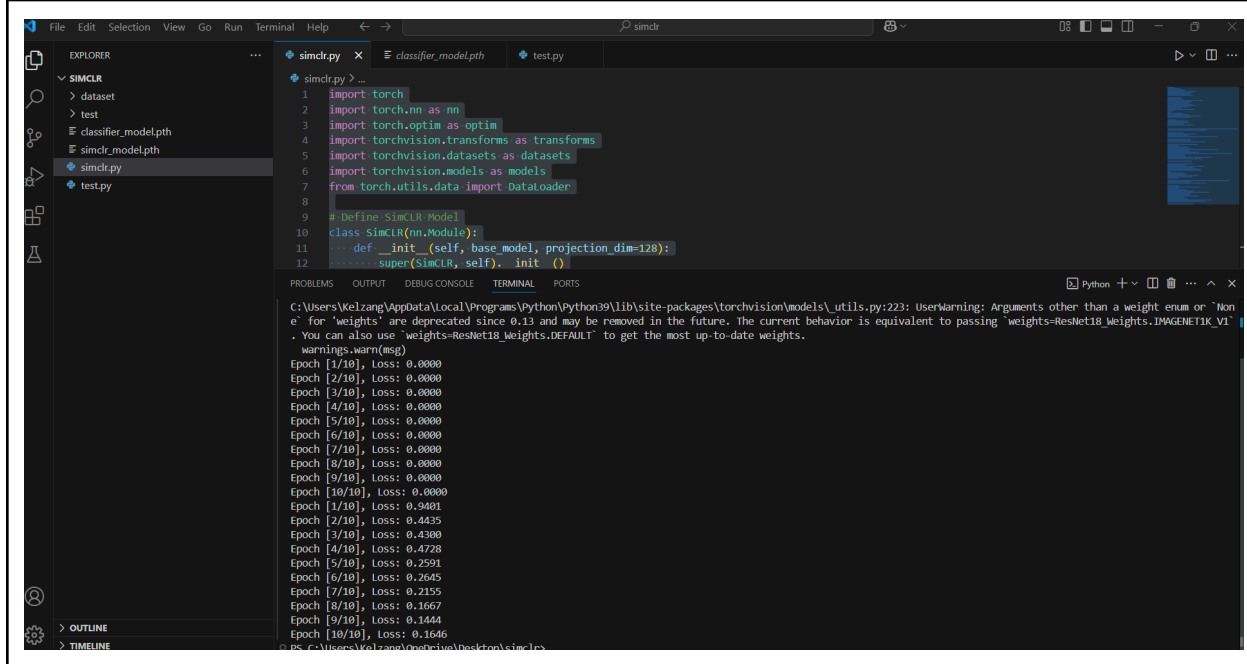
Train a ResNet18-based SimCLR model for contrastive feature learning.

Use the trained SimCLR encoder to extract meaningful features.

Train a classifier using extracted features to categorize images into three classes.

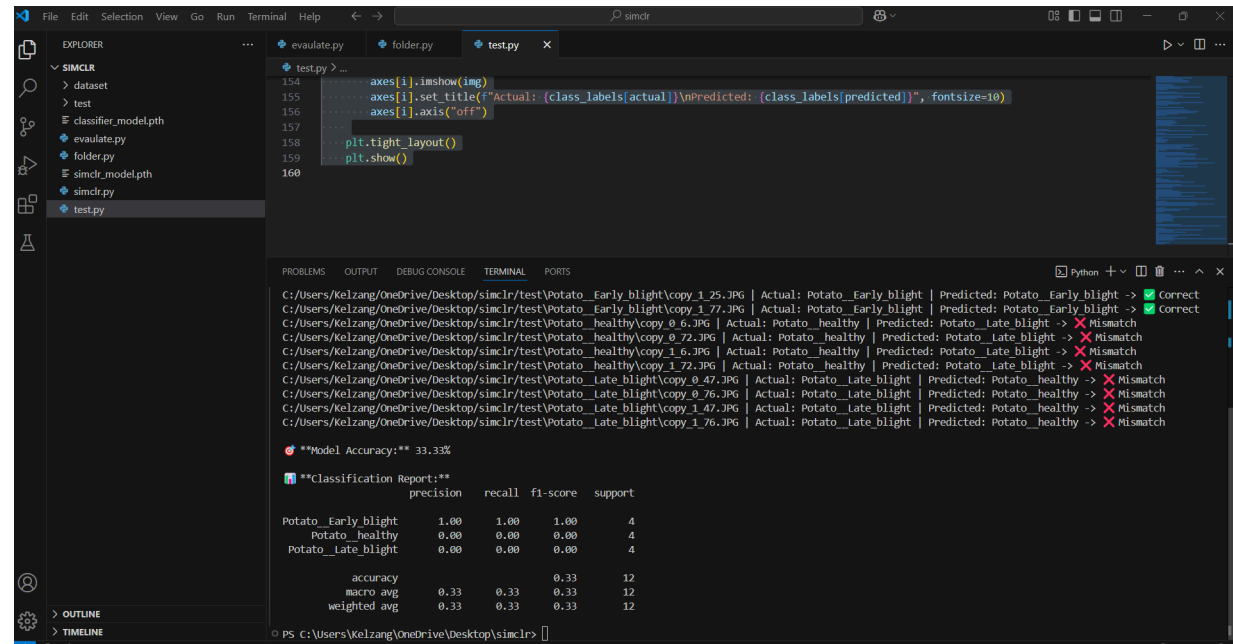
Save trained models for later use in inference and deployment.

Training the model



```
1 import torch
2 import torch.nn as nn
3 import torch.optim as optim
4 import torchvision.transforms as transforms
5 import torchvision.datasets as datasets
6 import torchvision.models as models
7 from torch.utils.data import DataLoader
8
9 # Define SimCLR Model
10 class SimCLR(nn.Module):
11     def __init__(self, base_model, projection_dim=128):
12         super(SimCLR, self).__init__()
13
14 C:\Users\Kelzang\AppData\Local\Programs\Python\Python39\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.
15 warnings.warn(msg)
16 Epoch [1/10], Loss: 0.0000
17 Epoch [2/10], Loss: 0.0000
18 Epoch [3/10], Loss: 0.0000
19 Epoch [4/10], Loss: 0.0000
20 Epoch [5/10], Loss: 0.0000
21 Epoch [6/10], Loss: 0.0000
22 Epoch [7/10], Loss: 0.0000
23 Epoch [8/10], Loss: 0.0000
24 Epoch [9/10], Loss: 0.0000
25 Epoch [10/10], Loss: 0.0000
26 Epoch [1/10], Loss: 0.9401
27 Epoch [2/10], Loss: 0.4435
28 Epoch [3/10], Loss: 0.4300
29 Epoch [4/10], Loss: 0.4728
30 Epoch [5/10], Loss: 0.2591
31 Epoch [6/10], Loss: 0.2645
32 Epoch [7/10], Loss: 0.2155
33 Epoch [8/10], Loss: 0.1667
34 Epoch [9/10], Loss: 0.1444
35 Epoch [10/10], Loss: 0.1646
```

Testing and performance of the model



```
test.py > ...
154 axes[i].imshow(img)
155 axes[i].set_title(f"Actual: {class_labels[actual]}\nPredicted: {class_labels[predicted]}", fontsize=10)
156 axes[i].axis("off")
157
158 plt.tight_layout()
159 plt.show()
160
```

```
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Early_blight/copy_1_25.JPG | Actual: Potato_Early_blight | Predicted: Potato_Early_blight -> ✓ correct
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Early_blight/copy_1_77.JPG | Actual: Potato_Early_blight | Predicted: Potato_Early_blight -> ✓ correct
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_healthy/copy_0_6.JPG | Actual: Potato_healthy | Predicted: Potato_Late_blight -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_healthy/copy_0_72.JPG | Actual: Potato_healthy | Predicted: Potato_Late_blight -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_healthy/copy_1_6.JPG | Actual: Potato_healthy | Predicted: Potato_Late_blight -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_healthy/copy_1_72.JPG | Actual: Potato_healthy | Predicted: Potato_Late_blight -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Late_blight/copy_0_47.JPG | Actual: Potato_Late_blight | Predicted: Potato_healthy -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Late_blight/copy_0_76.JPG | Actual: Potato_Late_blight | Predicted: Potato_healthy -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Late_blight/copy_1_47.JPG | Actual: Potato_Late_blight | Predicted: Potato_healthy -> ✗ Mismatch
C:/Users/Kelzang/OneDrive/Desktop/simclr/test/Potato_Late_blight/copy_1_76.JPG | Actual: Potato_Late_blight | Predicted: Potato_healthy -> ✗ Mismatch

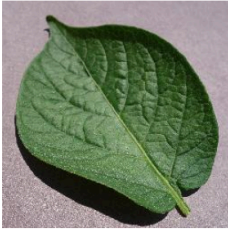
**Model Accuracy:** 33.33%

**Classification Report:**
      precision    recall  f1-score   support

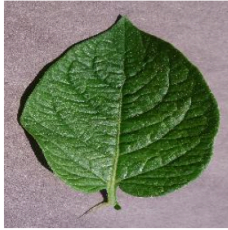
Potato_Early_blight      1.00      1.00      1.00         4
Potato_healthy           0.00      0.00      0.00         4
Potato_Late_blight       0.00      0.00      0.00         4

 accuracy          0.33      0.33      0.33      12
 macro avg         0.33      0.33      0.33      12
 weighted avg      0.33      0.33      0.33      12
```

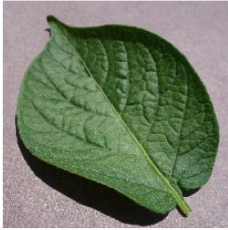
Actual: Potato_healthy
Predicted: Potato_Late_blight



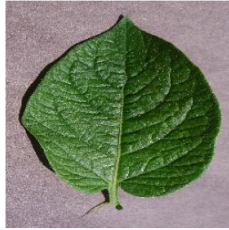
Actual: Potato_healthy
Predicted: Potato_Late_blight



Actual: Potato_healthy
Predicted: Potato_Late_blight



Actual: Potato_healthy
Predicted: Potato_Late_blight



Actual: Potato_Late_blight
Predicted: Potato_healthy

