

--- Fold 1 ---

Epoch 1/10, Size: 128, Loss: 3.6864, Accuracy: 13.42%
Validation Loss: 1.7367, Validation Accuracy: 57.65%
Validation loss decreased (inf → 1.736701). Saving model...
Epoch 2/10, Size: 128, Loss: 2.7801, Accuracy: 22.12%
Validation Loss: 1.4442, Validation Accuracy: 62.79%
Validation loss decreased (1.736701 → 1.444242). Saving model...
Epoch 3/10, Size: 128, Loss: 2.6536, Accuracy: 26.34%
Validation Loss: 1.3775, Validation Accuracy: 63.62%
Validation loss decreased (1.444242 → 1.377526). Saving model...
Epoch 4/10, Size: 224, Loss: 1.9225, Accuracy: 38.73%
Validation Loss: 0.6735, Validation Accuracy: 81.27%
Validation loss decreased (1.377526 → 0.673453). Saving model...
Epoch 5/10, Size: 224, Loss: 1.9763, Accuracy: 36.53%
Validation Loss: 0.6420, Validation Accuracy: 83.18%
Validation loss decreased (0.673453 → 0.641971). Saving model...
Epoch 6/10, Size: 224, Loss: 1.9267, Accuracy: 33.44%
Validation Loss: 0.6139, Validation Accuracy: 81.08%
Validation loss decreased (0.641971 → 0.613878). Saving model...
Epoch 7/10, Size: 224, Loss: 1.8553, Accuracy: 38.25%
Validation Loss: 0.5762, Validation Accuracy: 82.98%
Validation loss decreased (0.613878 → 0.576204). Saving model...
Epoch 8/10, Size: 224, Loss: 1.7257, Accuracy: 41.56%
Validation Loss: 0.5716, Validation Accuracy: 83.18%
Validation loss decreased (0.576204 → 0.571605). Saving model...
Epoch 9/10, Size: 224, Loss: 1.7840, Accuracy: 38.74%
Validation Loss: 0.5853, Validation Accuracy: 83.77%
EarlyStopping counter: 1 out of 5
Epoch 10/10, Size: 224, Loss: 1.8064, Accuracy: 41.76%
Validation Loss: 0.6126, Validation Accuracy: 83.03%
EarlyStopping counter: 2 out of 5

--- Fold 2 ---

Epoch 1/10, Size: 128, Loss: 3.7880, Accuracy: 11.04%
Validation Loss: 1.8276, Validation Accuracy: 55.75%
Validation loss decreased (inf → 1.827594). Saving model...
Epoch 2/10, Size: 128, Loss: 2.7440, Accuracy: 25.62%
Validation Loss: 1.4400, Validation Accuracy: 62.98%
Validation loss decreased (1.827594 → 1.440000). Saving model...
Epoch 3/10, Size: 128, Loss: 2.6390, Accuracy: 26.56%
Validation Loss: 1.3567, Validation Accuracy: 66.50%
Validation loss decreased (1.440000 → 1.356711). Saving model...
Epoch 4/10, Size: 224, Loss: 2.0852, Accuracy: 36.27%

Epoch 4/10, Size: 224, Loss: 2.0852, Accuracy: 36.27%
Validation Loss: 0.7120, Validation Accuracy: 81.32%
Validation loss decreased (1.356711 → 0.712004). Saving model...
Epoch 5/10, Size: 224, Loss: 1.8746, Accuracy: 38.68%
Validation Loss: 0.6408, Validation Accuracy: 82.54%
Validation loss decreased (0.712004 → 0.640777). Saving model...
Epoch 6/10, Size: 224, Loss: 1.9378, Accuracy: 36.90%
Validation Loss: 0.6408, Validation Accuracy: 83.96%
EarlyStopping counter: 1 out of 5
Epoch 7/10, Size: 224, Loss: 1.8099, Accuracy: 36.68%
Validation Loss: 0.6725, Validation Accuracy: 83.13%
EarlyStopping counter: 2 out of 5
Epoch 8/10, Size: 224, Loss: 1.8075, Accuracy: 36.21%
Validation Loss: 0.5954, Validation Accuracy: 83.33%
Validation loss decreased (0.640777 → 0.595361). Saving model...
Epoch 9/10, Size: 224, Loss: 1.7847, Accuracy: 36.68%
Validation Loss: 0.5567, Validation Accuracy: 84.60%
Validation loss decreased (0.595361 → 0.556652). Saving model...
Epoch 10/10, Size: 224, Loss: 1.7814, Accuracy: 37.02%
Validation Loss: 0.5871, Validation Accuracy: 84.65%
EarlyStopping counter: 1 out of 5

--- Fold 3 ---

Epoch 1/10, Size: 128, Loss: 3.7248, Accuracy: 12.11%
Validation Loss: 1.7824, Validation Accuracy: 56.07%
Validation loss decreased (inf → 1.782367). Saving model...
Epoch 2/10, Size: 128, Loss: 2.8946, Accuracy: 25.08%
Validation Loss: 1.4832, Validation Accuracy: 61.35%
Validation loss decreased (1.782367 → 1.483180). Saving model...
Epoch 3/10, Size: 128, Loss: 2.6267, Accuracy: 28.00%
Validation Loss: 1.3694, Validation Accuracy: 63.70%
Validation loss decreased (1.483180 → 1.369413). Saving model...
Epoch 4/10, Size: 224, Loss: 1.9955, Accuracy: 36.98%
Validation Loss: 0.6913, Validation Accuracy: 82.05%
Validation loss decreased (1.369413 → 0.691308). Saving model...
Epoch 5/10, Size: 224, Loss: 1.9053, Accuracy: 37.01%
Validation Loss: 0.6399, Validation Accuracy: 82.24%
Validation loss decreased (0.691308 → 0.639853). Saving model...
Epoch 6/10, Size: 224, Loss: 1.8368, Accuracy: 41.67%
Validation Loss: 0.5580, Validation Accuracy: 84.88%
Validation loss decreased (0.639853 → 0.557987). Saving model...
Epoch 7/10, Size: 224, Loss: 1.7830, Accuracy: 37.48%

Epoch 7/10, Size: 224, Loss: 1.7830, Accuracy: 37.48%
Validation Loss: 0.6004, Validation Accuracy: 83.32%
EarlyStopping counter: 1 out of 5
Epoch 8/10, Size: 224, Loss: 1.8850, Accuracy: 40.85%
Validation Loss: 0.6154, Validation Accuracy: 83.71%
EarlyStopping counter: 2 out of 5
Epoch 9/10, Size: 224, Loss: 1.7020, Accuracy: 37.60%
Validation Loss: 0.6016, Validation Accuracy: 83.56%
EarlyStopping counter: 3 out of 5
Epoch 10/10, Size: 224, Loss: 1.6988, Accuracy: 40.76%
Validation Loss: 0.5718, Validation Accuracy: 84.15%
EarlyStopping counter: 4 out of 5

--- Fold 4 ---

Epoch 1/10, Size: 128, Loss: 3.7048, Accuracy: 12.83%
Validation Loss: 1.7347, Validation Accuracy: 57.93%
Validation loss decreased (inf → 1.734675). Saving model...
Epoch 2/10, Size: 128, Loss: 2.8009, Accuracy: 24.44%
Validation Loss: 1.4888, Validation Accuracy: 62.62%
Validation loss decreased (1.734675 → 1.488814). Saving model...
Epoch 3/10, Size: 128, Loss: 2.6886, Accuracy: 25.87%
Validation Loss: 1.3449, Validation Accuracy: 66.24%
Validation loss decreased (1.488814 → 1.344873). Saving model...
Epoch 4/10, Size: 224, Loss: 2.0391, Accuracy: 35.40%
Validation Loss: 0.7423, Validation Accuracy: 81.51%
Validation loss decreased (1.344873 → 0.742347). Saving model...
Epoch 5/10, Size: 224, Loss: 1.9877, Accuracy: 35.40%
Validation Loss: 0.6050, Validation Accuracy: 82.49%
Validation loss decreased (0.742347 → 0.604951). Saving model...
Epoch 6/10, Size: 224, Loss: 1.9313, Accuracy: 39.33%
Validation Loss: 0.6131, Validation Accuracy: 83.81%
EarlyStopping counter: 1 out of 5
Epoch 7/10, Size: 224, Loss: 1.8894, Accuracy: 41.51%
Validation Loss: 0.7043, Validation Accuracy: 84.20%
EarlyStopping counter: 2 out of 5
Epoch 8/10, Size: 224, Loss: 1.7660, Accuracy: 40.35%
Validation Loss: 0.6104, Validation Accuracy: 85.13%
EarlyStopping counter: 3 out of 5
Epoch 9/10, Size: 224, Loss: 1.8246, Accuracy: 42.13%
Validation Loss: 0.6109, Validation Accuracy: 84.34%
EarlyStopping counter: 4 out of 5

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EarlyStopping counter: 4 out of 5
Epoch 10/10, Size: 224, Loss: 1.7206, Accuracy: 43.95%
Validation Loss: 0.5874, Validation Accuracy: 84.98%
Validation loss decreased (0.604951 → 0.587445). Saving model...

--- Fold 5 ---
Epoch 1/10, Size: 128, Loss: 3.7531, Accuracy: 11.41%
Validation Loss: 1.8220, Validation Accuracy: 54.26%
Validation loss decreased (inf → 1.821973). Saving model...
Epoch 2/10, Size: 128, Loss: 2.8255, Accuracy: 23.05%
Validation Loss: 1.4530, Validation Accuracy: 62.33%
Validation loss decreased (1.821973 → 1.453012). Saving model...
Epoch 3/10, Size: 128, Loss: 2.6204, Accuracy: 25.86%
Validation Loss: 1.3604, Validation Accuracy: 65.46%
Validation loss decreased (1.453012 → 1.360415). Saving model...
Epoch 4/10, Size: 224, Loss: 1.9970, Accuracy: 33.25%
Validation Loss: 0.7034, Validation Accuracy: 81.21%
Validation loss decreased (1.360415 → 0.703437). Saving model...
Epoch 5/10, Size: 224, Loss: 1.8900, Accuracy: 37.87%
Validation Loss: 0.7275, Validation Accuracy: 81.36%
EarlyStopping counter: 1 out of 5
Epoch 6/10, Size: 224, Loss: 1.7943, Accuracy: 37.70%
Validation Loss: 0.6454, Validation Accuracy: 82.83%
Validation loss decreased (0.703437 → 0.645428). Saving model...
Epoch 7/10, Size: 224, Loss: 1.8834, Accuracy: 37.76%
Validation Loss: 0.6297, Validation Accuracy: 83.12%
Validation loss decreased (0.645428 → 0.629690). Saving model...
Epoch 8/10, Size: 224, Loss: 1.8241, Accuracy: 37.43%
Validation Loss: 0.5746, Validation Accuracy: 84.00%
Validation loss decreased (0.629690 → 0.574560). Saving model...
Epoch 9/10, Size: 224, Loss: 1.6733, Accuracy: 40.40%
Validation Loss: 0.5749, Validation Accuracy: 83.71%
EarlyStopping counter: 1 out of 5
Epoch 10/10, Size: 224, Loss: 1.8260, Accuracy: 38.74%
Validation Loss: 0.5885, Validation Accuracy: 83.32%
EarlyStopping counter: 2 out of 5
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TTA Test Accuracy: 3.62%

```
# 測試集的評估
test_accuracy = 0
with torch.no_grad():
    for images, labels in val_loader:
        images, labels = images.to(device), labels.to(device)

        outputs = model(images)
        _, predicted = torch.max(outputs, 1)

        test_accuracy += (predicted == labels).sum().item()

test_accuracy = 100 * test_accuracy / len(val_dataset)
print(f"Test Accuracy: {test_accuracy:.2f}%")

import os
```

Last executed at 2025-05-19 05:55:10 in 3m 19.82s

Test Accuracy: 83.37%