run

April 1, 2025

[5]:
```
from tqdm import tqdm
import torch
import torch.nn as nn
import torch.optim as optim
from sklearn.metrics import accuracy_score, classification_report
import pandas as pd
from social_lstm_classifier import SocialLSTMClassifier

trajectory_features = ['Positionx', 'Positiony', 'Distance', 'Speed', 'Speed␣
 ↪Change', 'Direction', 'Direction Change']

feature_combos = {
    # 'xy_2': ['Positionx', 'Positiony'],
    # 'xyd_3': ['Positionx', 'Positiony', 'Distance'],
    'xydsdc_7': ['Positionx', 'Positiony', 'Distance', 'Speed', 'Direction',␣
 ↪'Speed Change', 'Direction Change'],
    # 'xysd_4': ['Positionx', 'Positiony', 'Speed', 'Direction'],
    # 'xyds_4': ['Positionx', 'Positiony', 'Distance', 'Speed'],
    # 'xydd_4': ['Positionx', 'Positiony', 'Distance', 'Direction'],
    # 'xydsc_5': ['Positionx', 'Positiony', 'Distance', 'Speed', 'Speed␣
 ↪Change'],
    # 'xyddc_5': ['Positionx', 'Positiony', 'Distance', 'Direction', 'Direction␣
 ↪Change'],
    # 'xys_3': ['Positionx', 'Positiony', 'Speed'],
    'xydi_3': ['Positionx', 'Positiony', 'Direction'],
    # 'xysc_4': ['Positionx', 'Positiony', 'Speed', 'Speed Change'],
    'xydc_4': ['Positionx', 'Positiony', 'Direction', 'Direction Change']
}

train_data = torch.load("/Users/anzhunie/Desktop/Pedestrian_Training/Prediction/
 ↪train_social_lstm_full.pt")
test_data = torch.load("/Users/anzhunie/Desktop/Pedestrian_Training/Prediction/
 ↪test_social_lstm_full.pt")

results = []

def run_experiment(feature_set, name):
```

```
    input_size = len(feature_set)
    index_map = [trajectory_features.index(f) for f in feature_set]

    model = SocialLSTMClassifier(input_size=input_size)
    criterion = nn.CrossEntropyLoss()
    optimizer = optim.Adam(model.parameters(), lr=0.001)
    epochs = 50

    model.train()
    for epoch in range(epochs):
        total_loss = 0.0
        for sample in tqdm(train_data, desc=f"Epoch {epoch+1}/{epochs}"):
            traj = sample['trajectory'][:, index_map].unsqueeze(1)
            neighbors = sample['neighbors'][:, :, index_map]
            mask = sample['neighbor_mask']
            label = torch.tensor([int(sample['cluster']) - 1], dtype=torch.long)

            optimizer.zero_grad()
            logits = model(traj, neighbors, mask)
            loss = criterion(logits, label)
            loss.backward()
            optimizer.step()

            total_loss += loss.item()

        avg_loss = total_loss / len(train_data)
        print(f"\n[Feature Set: {name}] Epoch [{epoch+1}/{epochs}] - Avg Loss:␣
↪{avg_loss:.4f}")


    model.eval()
    y_true = []
    y_pred = []
    with torch.no_grad():
       for sample in tqdm(train_data, desc=f"Epoch {epoch+1}/{epochs}"):
            traj = sample['trajectory'][:, index_map].unsqueeze(1)
            neighbors = sample['neighbors'][:, :, index_map]
            mask = sample['neighbor_mask']
            label = int(sample['cluster']) - 1
            logits = model(traj, neighbors, mask)
            pred = logits.argmax(dim=1).item()
            y_true.append(label)
            y_pred.append(pred)

    acc = accuracy_score(y_true, y_pred)
    clf_report = classification_report(y_true, y_pred, output_dict=True)
    results.append({
```

```
        "Feature_Set": name,
        "Accuracy": acc,
        "Macro_F1": clf_report['macro avg']['f1-score'],
        "Weighted_F1": clf_report['weighted avg']['f1-score']
    })

for name, feats in feature_combos.items():
    run_experiment(feats, name)
```

```
/var/folders/nt/7f1y5h8s6qd2mh1ypgjkgbpw0000gn/T/ipykernel_83720/4236565242.py:2
6: FutureWarning: You are using `torch.load` with `weights_only=False` (the
current default value), which uses the default pickle module implicitly. It is
possible to construct malicious pickle data which will execute arbitrary code
during unpickling (See
https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models for
more details). In a future release, the default value for `weights_only` will be
flipped to `True`. This limits the functions that could be executed during
unpickling. Arbitrary objects will no longer be allowed to be loaded via this
mode unless they are explicitly allowlisted by the user via
`torch.serialization.add_safe_globals`. We recommend you start setting
`weights_only=True` for any use case where you don't have full control of the
loaded file. Please open an issue on GitHub for any issues related to this
experimental feature.
  train_data = torch.load("/Users/anzhunie/Desktop/Pedestrian_Training/Predictio
n/train_social_lstm_full.pt")
/var/folders/nt/7f1y5h8s6qd2mh1ypgjkgbpw0000gn/T/ipykernel_83720/4236565242.py:2
7: FutureWarning: You are using `torch.load` with `weights_only=False` (the
current default value), which uses the default pickle module implicitly. It is
possible to construct malicious pickle data which will execute arbitrary code
during unpickling (See
https://github.com/pytorch/pytorch/blob/main/SECURITY.md#untrusted-models for
more details). In a future release, the default value for `weights_only` will be
flipped to `True`. This limits the functions that could be executed during
unpickling. Arbitrary objects will no longer be allowed to be loaded via this
mode unless they are explicitly allowlisted by the user via
`torch.serialization.add_safe_globals`. We recommend you start setting
`weights_only=True` for any use case where you don't have full control of the
loaded file. Please open an issue on GitHub for any issues related to this
experimental feature.
  test_data = torch.load("/Users/anzhunie/Desktop/Pedestrian_Training/Prediction
/test_social_lstm_full.pt")
Epoch 1/50: 100%|      | 4920/4920 [00:32<00:00, 150.89it/s]


[Feature Set: xydsdc_7] Epoch [1/50] - Avg Loss: 0.6447

Epoch 2/50: 100%|      | 4920/4920 [00:31<00:00, 155.87it/s]
```

```
[Feature Set: xydsdc_7] Epoch [2/50] - Avg Loss: 0.6139
Epoch 3/50: 100%|      | 4920/4920 [00:31<00:00, 154.56it/s]

[Feature Set: xydsdc_7] Epoch [3/50] - Avg Loss: 0.5896
Epoch 4/50: 100%|      | 4920/4920 [00:31<00:00, 155.02it/s]

[Feature Set: xydsdc_7] Epoch [4/50] - Avg Loss: 0.5626
Epoch 5/50: 100%|      | 4920/4920 [00:31<00:00, 154.05it/s]

[Feature Set: xydsdc_7] Epoch [5/50] - Avg Loss: 0.5326
Epoch 6/50: 100%|      | 4920/4920 [00:32<00:00, 152.26it/s]

[Feature Set: xydsdc_7] Epoch [6/50] - Avg Loss: 0.5067
Epoch 7/50: 100%|      | 4920/4920 [00:31<00:00, 157.27it/s]

[Feature Set: xydsdc_7] Epoch [7/50] - Avg Loss: 0.4680
Epoch 8/50: 100%|      | 4920/4920 [00:32<00:00, 151.60it/s]

[Feature Set: xydsdc_7] Epoch [8/50] - Avg Loss: 0.4246
Epoch 9/50: 100%|      | 4920/4920 [00:31<00:00, 157.31it/s]

[Feature Set: xydsdc_7] Epoch [9/50] - Avg Loss: 0.3946
Epoch 10/50: 100%|     | 4920/4920 [00:30<00:00, 158.81it/s]

[Feature Set: xydsdc_7] Epoch [10/50] - Avg Loss: 0.3704
Epoch 11/50: 100%|     | 4920/4920 [00:32<00:00, 153.29it/s]

[Feature Set: xydsdc_7] Epoch [11/50] - Avg Loss: 0.3265
Epoch 12/50: 100%|     | 4920/4920 [00:30<00:00, 159.65it/s]

[Feature Set: xydsdc_7] Epoch [12/50] - Avg Loss: 0.3172
Epoch 13/50: 100%|     | 4920/4920 [00:30<00:00, 161.08it/s]

[Feature Set: xydsdc_7] Epoch [13/50] - Avg Loss: 0.2865
Epoch 14/50: 100%|     | 4920/4920 [00:31<00:00, 156.36it/s]
```

[Feature Set: xydsdc_7] Epoch [14/50] - Avg Loss: 0.2702

Epoch 15/50: 100%| | 4920/4920 [00:31<00:00, 154.14it/s]

[Feature Set: xydsdc_7] Epoch [15/50] - Avg Loss: 0.2541

Epoch 16/50: 100%| | 4920/4920 [00:32<00:00, 153.75it/s]

[Feature Set: xydsdc_7] Epoch [16/50] - Avg Loss: 0.2431

Epoch 17/50: 100%| | 4920/4920 [00:31<00:00, 157.02it/s]

[Feature Set: xydsdc_7] Epoch [17/50] - Avg Loss: 0.2155

Epoch 18/50: 100%| | 4920/4920 [00:31<00:00, 155.80it/s]

[Feature Set: xydsdc_7] Epoch [18/50] - Avg Loss: 0.2142

Epoch 19/50: 100%| | 4920/4920 [00:32<00:00, 153.07it/s]

[Feature Set: xydsdc_7] Epoch [19/50] - Avg Loss: 0.2147

Epoch 20/50: 100%| | 4920/4920 [00:31<00:00, 158.64it/s]

[Feature Set: xydsdc_7] Epoch [20/50] - Avg Loss: 0.1960

Epoch 21/50: 100%| | 4920/4920 [00:32<00:00, 153.29it/s]

[Feature Set: xydsdc_7] Epoch [21/50] - Avg Loss: 0.2051

Epoch 22/50: 100%| | 4920/4920 [00:30<00:00, 160.35it/s]

[Feature Set: xydsdc_7] Epoch [22/50] - Avg Loss: 0.1823

Epoch 23/50: 100%| | 4920/4920 [00:30<00:00, 160.73it/s]

[Feature Set: xydsdc_7] Epoch [23/50] - Avg Loss: 0.1744

Epoch 24/50: 100%| | 4920/4920 [00:31<00:00, 156.40it/s]

[Feature Set: xydsdc_7] Epoch [24/50] - Avg Loss: 0.1719

Epoch 25/50: 100%| | 4920/4920 [00:31<00:00, 156.39it/s]

[Feature Set: xydsdc_7] Epoch [25/50] - Avg Loss: 0.1559

Epoch 26/50: 100%| | 4920/4920 [00:31<00:00, 153.94it/s]

[Feature Set: xydsdc_7] Epoch [26/50] - Avg Loss: 0.1551

Epoch 27/50: 100%| | 4920/4920 [00:32<00:00, 152.46it/s]

[Feature Set: xydsdc_7] Epoch [27/50] - Avg Loss: 0.1551

Epoch 28/50: 100%| | 4920/4920 [00:31<00:00, 158.68it/s]

[Feature Set: xydsdc_7] Epoch [28/50] - Avg Loss: 0.1530

Epoch 29/50: 100%| | 4920/4920 [00:32<00:00, 149.54it/s]

[Feature Set: xydsdc_7] Epoch [29/50] - Avg Loss: 0.1519

Epoch 30/50: 100%| | 4920/4920 [00:31<00:00, 157.62it/s]

[Feature Set: xydsdc_7] Epoch [30/50] - Avg Loss: 0.1405

Epoch 31/50: 100%| | 4920/4920 [00:33<00:00, 147.33it/s]

[Feature Set: xydsdc_7] Epoch [31/50] - Avg Loss: 0.1312

Epoch 32/50: 100%| | 4920/4920 [00:30<00:00, 159.85it/s]

[Feature Set: xydsdc_7] Epoch [32/50] - Avg Loss: 0.1437

Epoch 33/50: 100%| | 4920/4920 [00:30<00:00, 161.29it/s]

[Feature Set: xydsdc_7] Epoch [33/50] - Avg Loss: 0.1342

Epoch 34/50: 100%| | 4920/4920 [00:30<00:00, 162.53it/s]

[Feature Set: xydsdc_7] Epoch [34/50] - Avg Loss: 0.1304

Epoch 35/50: 100%| | 4920/4920 [00:30<00:00, 162.36it/s]

[Feature Set: xydsdc_7] Epoch [35/50] - Avg Loss: 0.1161

Epoch 36/50: 100%| | 4920/4920 [00:30<00:00, 161.59it/s]

[Feature Set: xydsdc_7] Epoch [36/50] - Avg Loss: 0.1190

Epoch 37/50: 100%| | 4920/4920 [00:30<00:00, 161.92it/s]

[Feature Set: xydsdc_7] Epoch [37/50] - Avg Loss: 0.1167

Epoch 38/50: 100%| | 4920/4920 [00:30<00:00, 160.62it/s]

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[Feature Set: xydsdc_7] Epoch [38/50] - Avg Loss: 0.1049
Epoch 39/50: 100%|      | 4920/4920 [00:32<00:00, 150.08it/s]

[Feature Set: xydsdc_7] Epoch [39/50] - Avg Loss: 0.1094
Epoch 40/50: 100%|      | 4920/4920 [00:31<00:00, 155.78it/s]

[Feature Set: xydsdc_7] Epoch [40/50] - Avg Loss: 0.1074
Epoch 41/50: 100%|      | 4920/4920 [00:31<00:00, 158.64it/s]

[Feature Set: xydsdc_7] Epoch [41/50] - Avg Loss: 0.1206
Epoch 42/50: 100%|      | 4920/4920 [00:31<00:00, 157.39it/s]

[Feature Set: xydsdc_7] Epoch [42/50] - Avg Loss: 0.1040
Epoch 43/50: 100%|      | 4920/4920 [00:31<00:00, 155.56it/s]

[Feature Set: xydsdc_7] Epoch [43/50] - Avg Loss: 0.0991
Epoch 44/50: 100%|      | 4920/4920 [00:31<00:00, 158.02it/s]

[Feature Set: xydsdc_7] Epoch [44/50] - Avg Loss: 0.1112
Epoch 45/50: 100%|      | 4920/4920 [00:32<00:00, 153.62it/s]

[Feature Set: xydsdc_7] Epoch [45/50] - Avg Loss: 0.0935
Epoch 46/50: 100%|      | 4920/4920 [00:31<00:00, 154.55it/s]

[Feature Set: xydsdc_7] Epoch [46/50] - Avg Loss: 0.1243
Epoch 47/50: 100%|      | 4920/4920 [00:31<00:00, 157.62it/s]

[Feature Set: xydsdc_7] Epoch [47/50] - Avg Loss: 0.0944
Epoch 48/50: 100%|      | 4920/4920 [00:31<00:00, 157.24it/s]

[Feature Set: xydsdc_7] Epoch [48/50] - Avg Loss: 0.1027
Epoch 49/50: 100%|      | 4920/4920 [00:32<00:00, 151.56it/s]

[Feature Set: xydsdc_7] Epoch [49/50] - Avg Loss: 0.0923
Epoch 50/50: 100%|      | 4920/4920 [00:33<00:00, 146.30it/s]
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[Feature Set: xydsdc_7] Epoch [50/50] - Avg Loss: 0.1104
Epoch 50/50: 100%|      | 4920/4920 [00:14<00:00, 350.40it/s]
Epoch 1/50: 100%|      | 4920/4920 [00:31<00:00, 157.68it/s]

[Feature Set: xydi_3] Epoch [1/50] - Avg Loss: 0.6431
Epoch 2/50: 100%|      | 4920/4920 [00:31<00:00, 154.97it/s]

[Feature Set: xydi_3] Epoch [2/50] - Avg Loss: 0.6039
Epoch 3/50: 100%|      | 4920/4920 [00:31<00:00, 157.94it/s]

[Feature Set: xydi_3] Epoch [3/50] - Avg Loss: 0.5805
Epoch 4/50: 100%|      | 4920/4920 [00:31<00:00, 158.22it/s]

[Feature Set: xydi_3] Epoch [4/50] - Avg Loss: 0.5654
Epoch 5/50: 100%|      | 4920/4920 [00:30<00:00, 158.91it/s]

[Feature Set: xydi_3] Epoch [5/50] - Avg Loss: 0.5385
Epoch 6/50: 100%|      | 4920/4920 [00:30<00:00, 158.72it/s]

[Feature Set: xydi_3] Epoch [6/50] - Avg Loss: 0.5166
Epoch 7/50: 100%|      | 4920/4920 [00:31<00:00, 158.17it/s]

[Feature Set: xydi_3] Epoch [7/50] - Avg Loss: 0.4884
Epoch 8/50: 100%|      | 4920/4920 [00:30<00:00, 158.91it/s]

[Feature Set: xydi_3] Epoch [8/50] - Avg Loss: 0.4607
Epoch 9/50: 100%|      | 4920/4920 [00:31<00:00, 156.90it/s]

[Feature Set: xydi_3] Epoch [9/50] - Avg Loss: 0.4424
Epoch 10/50: 100%|      | 4920/4920 [00:31<00:00, 157.45it/s]

[Feature Set: xydi_3] Epoch [10/50] - Avg Loss: 0.4139
Epoch 11/50: 100%|      | 4920/4920 [00:35<00:00, 137.42it/s]

[Feature Set: xydi_3] Epoch [11/50] - Avg Loss: 0.3949
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Epoch 12/50: 100%|      | 4920/4920 [00:34<00:00, 143.94it/s]

[Feature Set: xydi_3] Epoch [12/50] - Avg Loss: 0.3700
Epoch 13/50: 100%|      | 4920/4920 [00:34<00:00, 142.02it/s]

[Feature Set: xydi_3] Epoch [13/50] - Avg Loss: 0.3627
Epoch 14/50: 100%|      | 4920/4920 [00:31<00:00, 156.36it/s]

[Feature Set: xydi_3] Epoch [14/50] - Avg Loss: 0.3482
Epoch 15/50: 100%|      | 4920/4920 [00:31<00:00, 158.55it/s]

[Feature Set: xydi_3] Epoch [15/50] - Avg Loss: 0.3251
Epoch 16/50: 100%|      | 4920/4920 [00:31<00:00, 155.76it/s]

[Feature Set: xydi_3] Epoch [16/50] - Avg Loss: 0.3229
Epoch 17/50: 100%|      | 4920/4920 [00:30<00:00, 159.37it/s]

[Feature Set: xydi_3] Epoch [17/50] - Avg Loss: 0.2975
Epoch 18/50: 100%|      | 4920/4920 [00:31<00:00, 155.59it/s]

[Feature Set: xydi_3] Epoch [18/50] - Avg Loss: 0.2838
Epoch 19/50: 100%|      | 4920/4920 [00:30<00:00, 161.10it/s]

[Feature Set: xydi_3] Epoch [19/50] - Avg Loss: 0.2788
Epoch 20/50: 100%|      | 4920/4920 [00:30<00:00, 161.79it/s]

[Feature Set: xydi_3] Epoch [20/50] - Avg Loss: 0.2546
Epoch 21/50: 100%|      | 4920/4920 [00:30<00:00, 162.29it/s]

[Feature Set: xydi_3] Epoch [21/50] - Avg Loss: 0.2688
Epoch 22/50: 100%|      | 4920/4920 [00:30<00:00, 160.39it/s]

[Feature Set: xydi_3] Epoch [22/50] - Avg Loss: 0.2477
Epoch 23/50: 100%|      | 4920/4920 [00:30<00:00, 162.17it/s]

[Feature Set: xydi_3] Epoch [23/50] - Avg Loss: 0.2288
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Epoch 24/50: 100%|      | 4920/4920 [00:30<00:00, 160.08it/s]

[Feature Set: xydi_3] Epoch [24/50] - Avg Loss: 0.2287
Epoch 25/50: 100%|      | 4920/4920 [00:30<00:00, 162.81it/s]

[Feature Set: xydi_3] Epoch [25/50] - Avg Loss: 0.2263
Epoch 26/50: 100%|      | 4920/4920 [00:30<00:00, 158.78it/s]

[Feature Set: xydi_3] Epoch [26/50] - Avg Loss: 0.2115
Epoch 27/50: 100%|      | 4920/4920 [00:31<00:00, 157.64it/s]

[Feature Set: xydi_3] Epoch [27/50] - Avg Loss: 0.2262
Epoch 28/50: 100%|      | 4920/4920 [00:33<00:00, 147.80it/s]

[Feature Set: xydi_3] Epoch [28/50] - Avg Loss: 0.1987
Epoch 29/50: 100%|      | 4920/4920 [00:32<00:00, 149.88it/s]

[Feature Set: xydi_3] Epoch [29/50] - Avg Loss: 0.1975
Epoch 30/50: 100%|      | 4920/4920 [00:31<00:00, 157.71it/s]

[Feature Set: xydi_3] Epoch [30/50] - Avg Loss: 0.2045
Epoch 31/50: 100%|      | 4920/4920 [00:31<00:00, 154.40it/s]

[Feature Set: xydi_3] Epoch [31/50] - Avg Loss: 0.1869
Epoch 32/50: 100%|      | 4920/4920 [00:30<00:00, 160.49it/s]

[Feature Set: xydi_3] Epoch [32/50] - Avg Loss: 0.1865
Epoch 33/50: 100%|      | 4920/4920 [00:30<00:00, 160.53it/s]

[Feature Set: xydi_3] Epoch [33/50] - Avg Loss: 0.2033
Epoch 34/50: 100%|      | 4920/4920 [00:30<00:00, 161.79it/s]

[Feature Set: xydi_3] Epoch [34/50] - Avg Loss: 0.1588
Epoch 35/50: 100%|      | 4920/4920 [00:31<00:00, 156.63it/s]

[Feature Set: xydi_3] Epoch [35/50] - Avg Loss: 0.1774
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Epoch 36/50: 100%|      | 4920/4920 [00:32<00:00, 151.84it/s]

[Feature Set: xydi_3] Epoch [36/50] - Avg Loss: 0.1934
Epoch 37/50: 100%|      | 4920/4920 [00:31<00:00, 153.85it/s]

[Feature Set: xydi_3] Epoch [37/50] - Avg Loss: 0.1599
Epoch 38/50: 100%|      | 4920/4920 [00:33<00:00, 148.48it/s]

[Feature Set: xydi_3] Epoch [38/50] - Avg Loss: 0.1616
Epoch 39/50: 100%|      | 4920/4920 [00:31<00:00, 157.56it/s]

[Feature Set: xydi_3] Epoch [39/50] - Avg Loss: 0.1497
Epoch 40/50: 100%|      | 4920/4920 [00:30<00:00, 160.08it/s]

[Feature Set: xydi_3] Epoch [40/50] - Avg Loss: 0.1661
Epoch 41/50: 100%|      | 4920/4920 [00:32<00:00, 153.19it/s]

[Feature Set: xydi_3] Epoch [41/50] - Avg Loss: 0.1488
Epoch 42/50: 100%|      | 4920/4920 [00:32<00:00, 152.39it/s]

[Feature Set: xydi_3] Epoch [42/50] - Avg Loss: 0.1480
Epoch 43/50: 100%|      | 4920/4920 [00:31<00:00, 158.55it/s]

[Feature Set: xydi_3] Epoch [43/50] - Avg Loss: 0.1595
Epoch 44/50: 100%|      | 4920/4920 [00:30<00:00, 159.55it/s]

[Feature Set: xydi_3] Epoch [44/50] - Avg Loss: 0.1498
Epoch 45/50: 100%|      | 4920/4920 [00:31<00:00, 155.58it/s]

[Feature Set: xydi_3] Epoch [45/50] - Avg Loss: 0.1452
Epoch 46/50: 100%|      | 4920/4920 [00:30<00:00, 160.02it/s]

[Feature Set: xydi_3] Epoch [46/50] - Avg Loss: 0.1510
Epoch 47/50: 100%|      | 4920/4920 [00:31<00:00, 154.83it/s]

[Feature Set: xydi_3] Epoch [47/50] - Avg Loss: 0.1361
```

```
Epoch 48/50: 100%|      | 4920/4920 [00:32<00:00, 153.40it/s]

[Feature Set: xydi_3] Epoch [48/50] - Avg Loss: 0.1321
Epoch 49/50: 100%|      | 4920/4920 [00:31<00:00, 158.38it/s]

[Feature Set: xydi_3] Epoch [49/50] - Avg Loss: 0.1656
Epoch 50/50: 100%|      | 4920/4920 [00:31<00:00, 156.48it/s]

[Feature Set: xydi_3] Epoch [50/50] - Avg Loss: 0.1274
Epoch 50/50: 100%|      | 4920/4920 [00:14<00:00, 343.98it/s]
Epoch 1/50: 100%|      | 4920/4920 [00:31<00:00, 158.67it/s]

[Feature Set: xydc_4] Epoch [1/50] - Avg Loss: 0.6427
Epoch 2/50: 100%|      | 4920/4920 [00:32<00:00, 151.92it/s]

[Feature Set: xydc_4] Epoch [2/50] - Avg Loss: 0.6125
Epoch 3/50: 100%|      | 4920/4920 [00:32<00:00, 153.71it/s]

[Feature Set: xydc_4] Epoch [3/50] - Avg Loss: 0.5946
Epoch 4/50: 100%|      | 4920/4920 [00:31<00:00, 155.98it/s]

[Feature Set: xydc_4] Epoch [4/50] - Avg Loss: 0.5713
Epoch 5/50: 100%|      | 4920/4920 [00:30<00:00, 160.53it/s]

[Feature Set: xydc_4] Epoch [5/50] - Avg Loss: 0.5475
Epoch 6/50: 100%|      | 4920/4920 [00:33<00:00, 145.63it/s]

[Feature Set: xydc_4] Epoch [6/50] - Avg Loss: 0.5139
Epoch 7/50: 100%|      | 4920/4920 [00:32<00:00, 153.14it/s]

[Feature Set: xydc_4] Epoch [7/50] - Avg Loss: 0.4825
Epoch 8/50: 100%|      | 4920/4920 [00:31<00:00, 155.91it/s]

[Feature Set: xydc_4] Epoch [8/50] - Avg Loss: 0.4538
Epoch 9/50: 100%|      | 4920/4920 [00:30<00:00, 160.39it/s]
```

```
[Feature Set: xydc_4] Epoch [9/50] - Avg Loss: 0.4237
Epoch 10/50: 100%|      | 4920/4920 [00:31<00:00, 158.59it/s]

[Feature Set: xydc_4] Epoch [10/50] - Avg Loss: 0.3855
Epoch 11/50: 100%|      | 4920/4920 [00:30<00:00, 160.37it/s]

[Feature Set: xydc_4] Epoch [11/50] - Avg Loss: 0.3624
Epoch 12/50: 100%|      | 4920/4920 [00:30<00:00, 159.64it/s]

[Feature Set: xydc_4] Epoch [12/50] - Avg Loss: 0.3353
Epoch 13/50: 100%|      | 4920/4920 [00:30<00:00, 160.83it/s]

[Feature Set: xydc_4] Epoch [13/50] - Avg Loss: 0.3095
Epoch 14/50: 100%|      | 4920/4920 [00:30<00:00, 160.48it/s]

[Feature Set: xydc_4] Epoch [14/50] - Avg Loss: 0.2987
Epoch 15/50: 100%|      | 4920/4920 [00:30<00:00, 159.92it/s]

[Feature Set: xydc_4] Epoch [15/50] - Avg Loss: 0.2763
Epoch 16/50: 100%|      | 4920/4920 [00:31<00:00, 154.22it/s]

[Feature Set: xydc_4] Epoch [16/50] - Avg Loss: 0.2544
Epoch 17/50: 100%|      | 4920/4920 [00:30<00:00, 158.74it/s]

[Feature Set: xydc_4] Epoch [17/50] - Avg Loss: 0.2468
Epoch 18/50: 100%|      | 4920/4920 [00:30<00:00, 158.81it/s]

[Feature Set: xydc_4] Epoch [18/50] - Avg Loss: 0.2284
Epoch 19/50: 100%|      | 4920/4920 [00:30<00:00, 160.42it/s]

[Feature Set: xydc_4] Epoch [19/50] - Avg Loss: 0.2314
Epoch 20/50: 100%|      | 4920/4920 [00:30<00:00, 160.12it/s]

[Feature Set: xydc_4] Epoch [20/50] - Avg Loss: 0.2266
Epoch 21/50: 100%|      | 4920/4920 [00:30<00:00, 159.54it/s]
```

```
[Feature Set: xydc_4] Epoch [21/50] - Avg Loss: 0.1933
Epoch 22/50: 100%|      | 4920/4920 [00:30<00:00, 160.62it/s]

[Feature Set: xydc_4] Epoch [22/50] - Avg Loss: 0.1885
Epoch 23/50: 100%|      | 4920/4920 [00:30<00:00, 160.10it/s]

[Feature Set: xydc_4] Epoch [23/50] - Avg Loss: 0.1968
Epoch 24/50: 100%|      | 4920/4920 [00:30<00:00, 161.10it/s]

[Feature Set: xydc_4] Epoch [24/50] - Avg Loss: 0.1850
Epoch 25/50: 100%|      | 4920/4920 [00:30<00:00, 159.64it/s]

[Feature Set: xydc_4] Epoch [25/50] - Avg Loss: 0.1802
Epoch 26/50: 100%|      | 4920/4920 [00:31<00:00, 157.09it/s]

[Feature Set: xydc_4] Epoch [26/50] - Avg Loss: 0.1528
Epoch 27/50: 100%|      | 4920/4920 [00:31<00:00, 155.62it/s]

[Feature Set: xydc_4] Epoch [27/50] - Avg Loss: 0.1747
Epoch 28/50: 100%|      | 4920/4920 [00:30<00:00, 160.75it/s]

[Feature Set: xydc_4] Epoch [28/50] - Avg Loss: 0.1591
Epoch 29/50: 100%|      | 4920/4920 [00:30<00:00, 160.23it/s]

[Feature Set: xydc_4] Epoch [29/50] - Avg Loss: 0.1766
Epoch 30/50: 100%|      | 4920/4920 [00:30<00:00, 159.31it/s]

[Feature Set: xydc_4] Epoch [30/50] - Avg Loss: 0.1488
Epoch 31/50: 100%|      | 4920/4920 [00:30<00:00, 159.27it/s]

[Feature Set: xydc_4] Epoch [31/50] - Avg Loss: 0.1567
Epoch 32/50: 100%|      | 4920/4920 [00:30<00:00, 159.67it/s]

[Feature Set: xydc_4] Epoch [32/50] - Avg Loss: 0.1549
Epoch 33/50: 100%|      | 4920/4920 [00:30<00:00, 159.48it/s]
```

```
[Feature Set: xydc_4] Epoch [33/50] - Avg Loss: 0.1438
Epoch 34/50: 100%|      | 4920/4920 [00:30<00:00, 160.62it/s]

[Feature Set: xydc_4] Epoch [34/50] - Avg Loss: 0.1221
Epoch 35/50: 100%|      | 4920/4920 [00:31<00:00, 158.03it/s]

[Feature Set: xydc_4] Epoch [35/50] - Avg Loss: 0.1391
Epoch 36/50: 100%|      | 4920/4920 [00:31<00:00, 157.23it/s]

[Feature Set: xydc_4] Epoch [36/50] - Avg Loss: 0.1161
Epoch 37/50: 100%|      | 4920/4920 [00:30<00:00, 158.99it/s]

[Feature Set: xydc_4] Epoch [37/50] - Avg Loss: 0.1257
Epoch 38/50: 100%|      | 4920/4920 [00:30<00:00, 159.91it/s]

[Feature Set: xydc_4] Epoch [38/50] - Avg Loss: 0.1372
Epoch 39/50: 100%|      | 4920/4920 [00:31<00:00, 155.33it/s]

[Feature Set: xydc_4] Epoch [39/50] - Avg Loss: 0.1171
Epoch 40/50: 100%|      | 4920/4920 [00:30<00:00, 159.14it/s]

[Feature Set: xydc_4] Epoch [40/50] - Avg Loss: 0.1299
Epoch 41/50: 100%|      | 4920/4920 [00:30<00:00, 158.93it/s]

[Feature Set: xydc_4] Epoch [41/50] - Avg Loss: 0.1246
Epoch 42/50: 100%|      | 4920/4920 [00:31<00:00, 154.19it/s]

[Feature Set: xydc_4] Epoch [42/50] - Avg Loss: 0.1153
Epoch 43/50: 100%|      | 4920/4920 [00:31<00:00, 158.55it/s]

[Feature Set: xydc_4] Epoch [43/50] - Avg Loss: 0.1107
Epoch 44/50: 100%|      | 4920/4920 [00:30<00:00, 159.05it/s]

[Feature Set: xydc_4] Epoch [44/50] - Avg Loss: 0.1201
Epoch 45/50: 100%|      | 4920/4920 [00:31<00:00, 157.19it/s]
```

```
[Feature Set: xydc_4] Epoch [45/50] - Avg Loss: 0.1171
Epoch 46/50: 100%|      | 4920/4920 [00:30<00:00, 161.44it/s]

[Feature Set: xydc_4] Epoch [46/50] - Avg Loss: 0.0999
Epoch 47/50: 100%|      | 4920/4920 [00:30<00:00, 162.83it/s]

[Feature Set: xydc_4] Epoch [47/50] - Avg Loss: 0.1140
Epoch 48/50: 100%|      | 4920/4920 [00:30<00:00, 162.32it/s]

[Feature Set: xydc_4] Epoch [48/50] - Avg Loss: 0.1129
Epoch 49/50: 100%|      | 4920/4920 [00:30<00:00, 161.69it/s]

[Feature Set: xydc_4] Epoch [49/50] - Avg Loss: 0.1074
Epoch 50/50: 100%|      | 4920/4920 [00:30<00:00, 162.99it/s]

[Feature Set: xydc_4] Epoch [50/50] - Avg Loss: 0.1075
Epoch 50/50: 100%|      | 4920/4920 [00:14<00:00, 347.07it/s]
```

[6]:
```
df_results = pd.DataFrame(results)
print(df_results)
# df_results.to_csv("/Users/anzhunie/Desktop/Pedestrian_Training/Prediction/
  ↪feature_combination_results.csv", index=False)
```

```
  Feature_Set  Accuracy  Macro_F1  Weighted_F1
0    xydsdc_7  0.977642  0.976188     0.977628
1      xydi_3  0.951423  0.947710     0.951120
2      xydc_4  0.954065  0.950906     0.953954
```