

Your AI GuardianAngel: A Deep Learning-Based Fall Detection System

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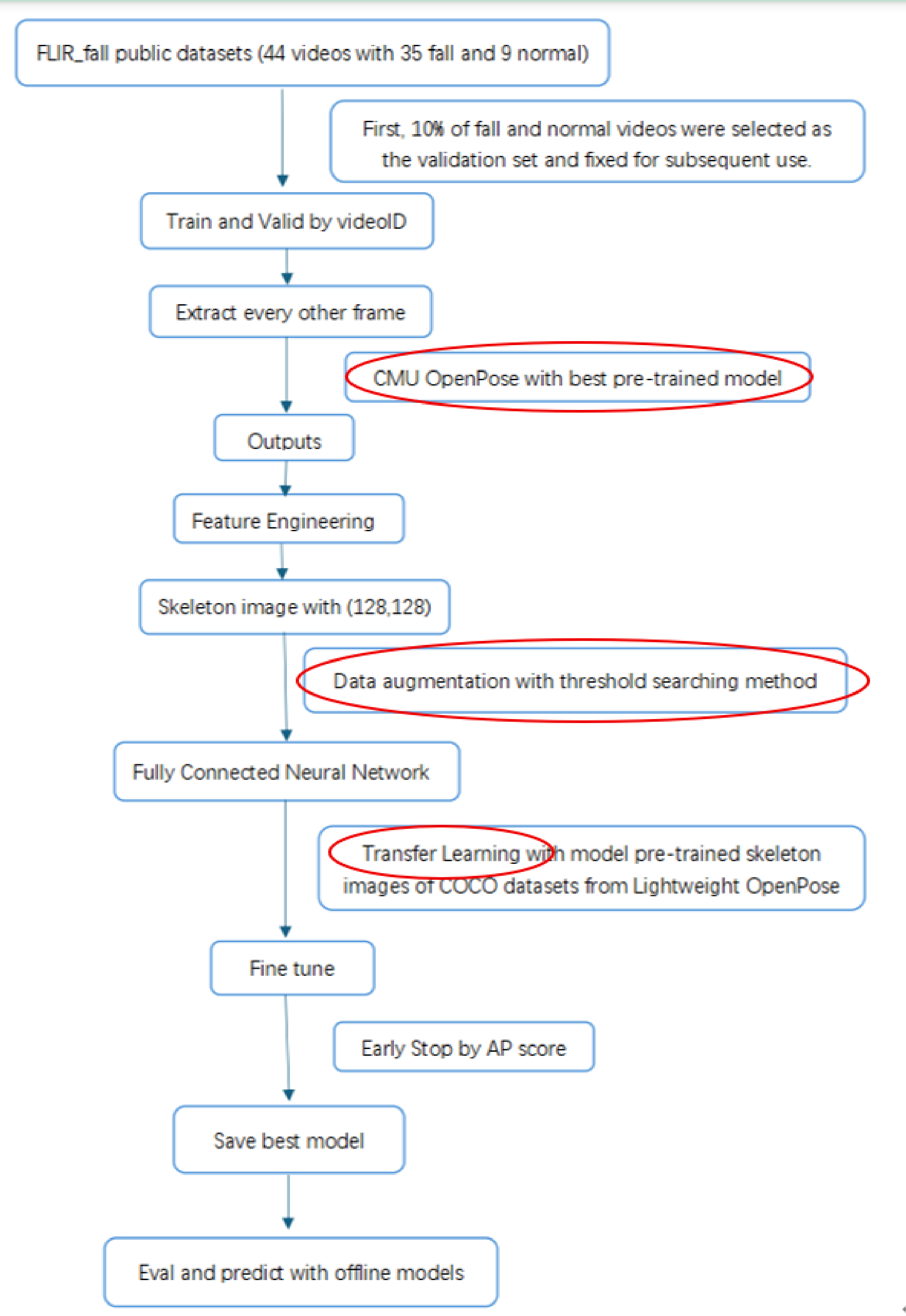
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■ Introduction

Problem Statement: Falls are severe, yet vision-based detection faces major challenges: environmental noise, extreme class imbalance, privacy concerns.

Core Target: Can we train a high-performance model using fast and efficient data under privacy-protection?

■ Creative Framework Design



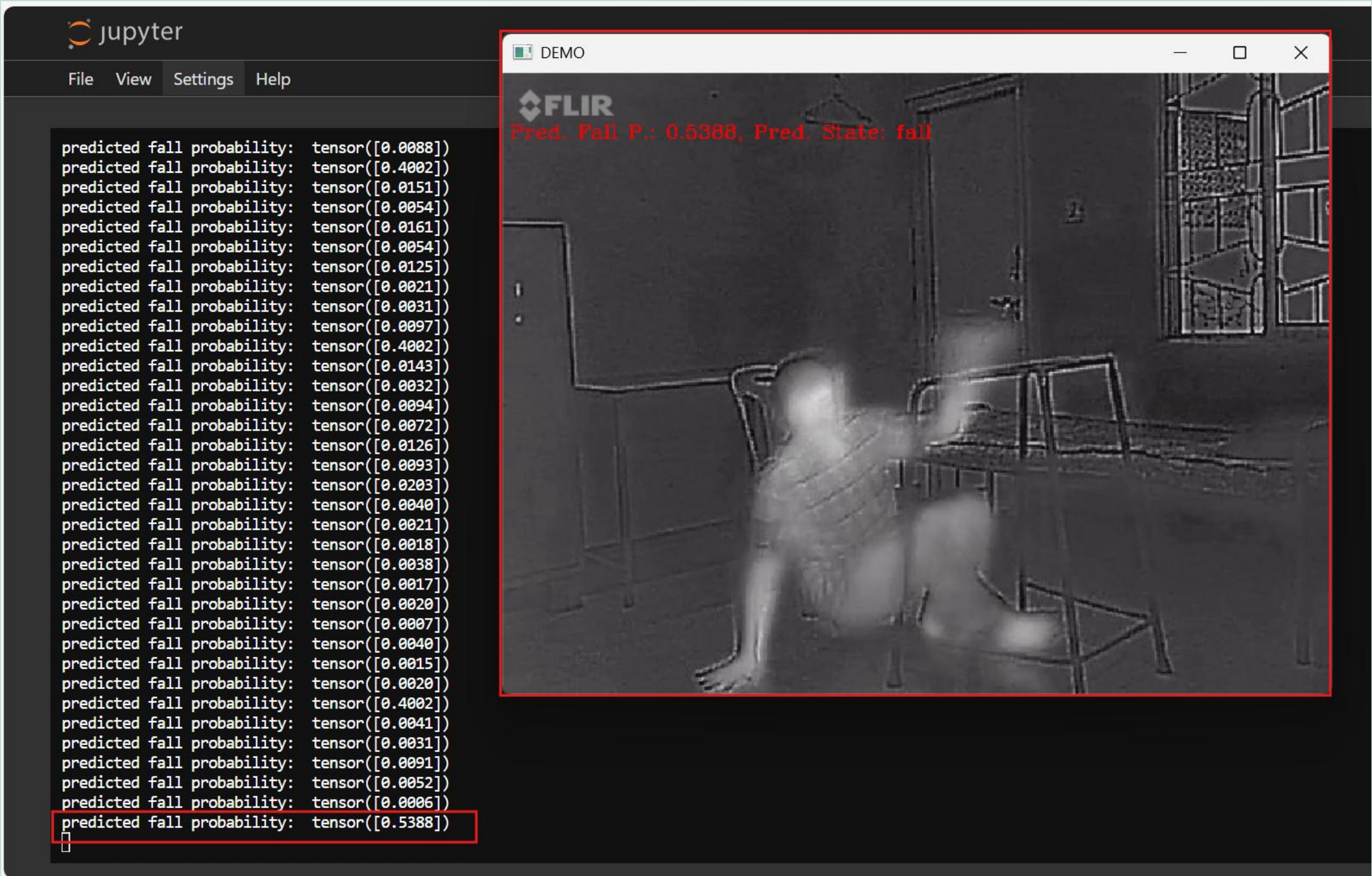
■ Original Contributes

1. Innovatively introduce **transfer learning** to fall detection.
2. As a **generalizable model** applicable to both binary and multi-class tasks in human pose estimation.
3. Present **feature engineering strategies** and a **creative two-tier model framework**—integrating **curriculum learning** and **transfer learning**—to inspire new perspectives and exploration.

■ Methods/Techniques

- 1 - **Transfer Learning**
- 2 - **Data augmentation** by **threshold search** method
- 3 - **Early stop** function with average precision score
- 4 - **Data pre-process** to avoid data leakage
- 5 - **Multi-criteria evaluation**
- 6 - **Interface of privacy-protecting** visualization

■ Interface Visualization



■ Model Performance

	dataset@epoch-100	mAP	mean f1_score	mean loss
0	train	0.9846	0.9550	0.0519
1	valid	0.9932	0.9051	0.1403

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1 1 train | AP: 0.9158, F1: 0.8692, loss: 0.1745
2 1 valid | AP: 0.9978, F1: 0.9850, loss: 0.0356
3 @1 valid increased from (0.000000 -> 0.997807). Saving model ...
4 2 train | AP: 0.9644, F1: 0.9251, loss: 0.0921
5 2 valid | AP: 0.9949, F1: 0.9676, loss: 0.0651
6 EarlyStopping counter: 1 out of 100
7 3 train | AP: 0.9774, F1: 0.9402, loss: 0.0716
8 3 valid | AP: 0.9945, F1: 0.9423, loss: 0.0870
9 EarlyStopping counter: 2 out of 100
10 4 train | AP: 0.9818, F1: 0.9462, loss: 0.0621
11 4 valid | AP: 0.9949, F1: 0.9320, loss: 0.1076
12 EarlyStopping counter: 3 out of 100
13 5 train | AP: 0.9834, F1: 0.9496, loss: 0.0569
14 5 valid | AP: 0.9949, F1: 0.9341, loss: 0.1102
15 EarlyStopping counter: 4 out of 100
16 6 train | AP: 0.9841, F1: 0.9507, loss: 0.0553
17 6 valid | AP: 0.9947, F1: 0.9373, loss: 0.0998
18 EarlyStopping counter: 5 out of 100
19 7 train | AP: 0.9838, F1: 0.9509, loss: 0.0546
20 7 valid | AP: 0.9934, F1: 0.9373, loss: 0.1047
21 EarlyStopping counter: 6 out of 100
22 8 train | AP: 0.9844, F1: 0.9515, loss: 0.0543
23 8 valid | AP: 0.9919, F1: 0.8918, loss: 0.1423
24 EarlyStopping counter: 7 out of 100
25 9 train | AP: 0.9845, F1: 0.9517, loss: 0.0537
26 9 valid | AP: 0.9924, F1: 0.9331, loss: 0.1088
27 EarlyStopping counter: 8 out of 100
28 10 train | AP: 0.9845, F1: 0.9518, loss: 0.0535
29 10 valid | AP: 0.9924, F1: 0.9372, loss: 0.0999
30 EarlyStopping counter: 9 out of 100
31 11 train | AP: 0.9842, F1: 0.9522, loss: 0.0532
32 11 valid | AP: 0.9934, F1: 0.9373, loss: 0.1004
33 EarlyStopping counter: 10 out of 100
34 12 train | AP: 0.9848, F1: 0.9520, loss: 0.0533
35 12 valid | AP: 0.9922, F1: 0.9286, loss: 0.1173
36 EarlyStopping counter: 11 out of 100
37 13 train | AP: 0.9849, F1: 0.9516, loss: 0.0532
38 13 valid | AP: 0.9934, F1: 0.9373, loss: 0.1010
39 EarlyStopping counter: 12 out of 100
40 14 train | AP: 0.9846, F1: 0.9522, loss: 0.0531
41 14 valid | AP: 0.9922, F1: 0.9331, loss: 0.1112
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