classify loitering behavior. The model achieves an accuracy of 92.65% for trajectory image classification.

Based on the results, several improvements can be made to enhance the proposed method. Expanding the dataset by recording videos in more locations could increase the variety and complexity of the dataset, improving adaptability to different CCTV setups. Additionally, exploring alternative methods for trajectory reconstruction, such as applying advanced tracking techniques, could lead to more accurate trajectory images. The current method is limited to detecting only a single person, so improving the detection and tracking algorithms to handle multiple individuals is essential for real-world applications. Moreover, using lightweight models for real-time detection and classification would be crucial for practical deployment. Future work could enhance the system's ability to detect individuals who loiter by remaining still in one place for an extended period, integrating this functionality into an automated security system with warning notifications.

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