

Evaluating ReID-Based Trackers for Robust Object Tracking in UAV Videos: A Feature Evolution Approach

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Improving Online Trackers via Feature Evolution Measurement

This study focuses on evaluating and enhancing the performance of ReID-based trackers in object tracking scenarios, particularly for UAV videos. Traditional immediate detection approaches may fail in challenging conditions, necessitating consideration of feature evolution over time.

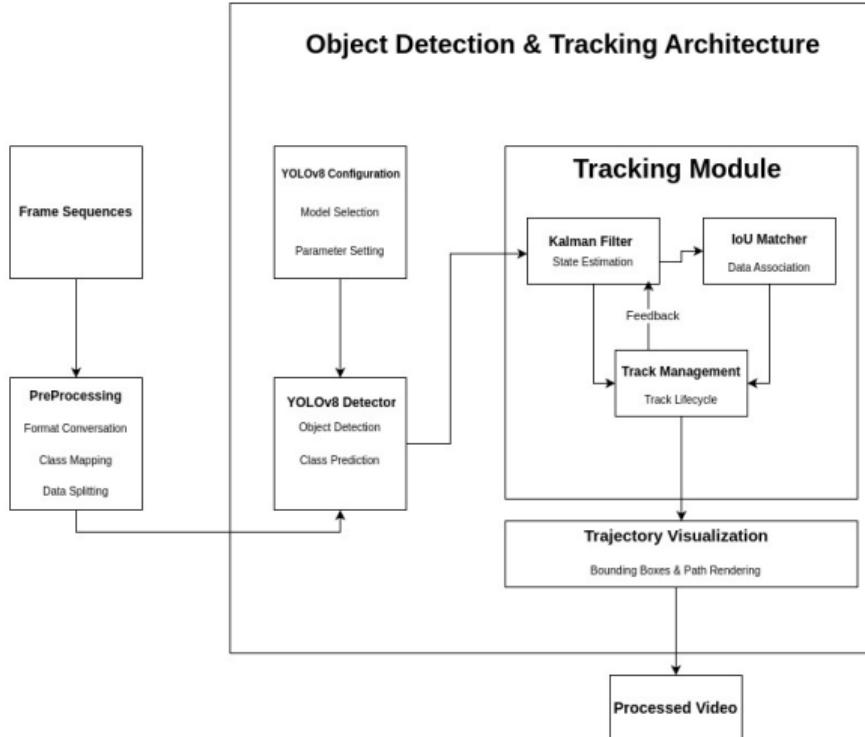
- Existing trackers face limitations in scenarios with occlusions, viewpoint changes, and varying illumination conditions common in UAV footage
- ReID-based methods offer potential for robust tracking through temporal feature matching
- Current frameworks lack comprehensive integration of feature evolution metrics

Literature Survey

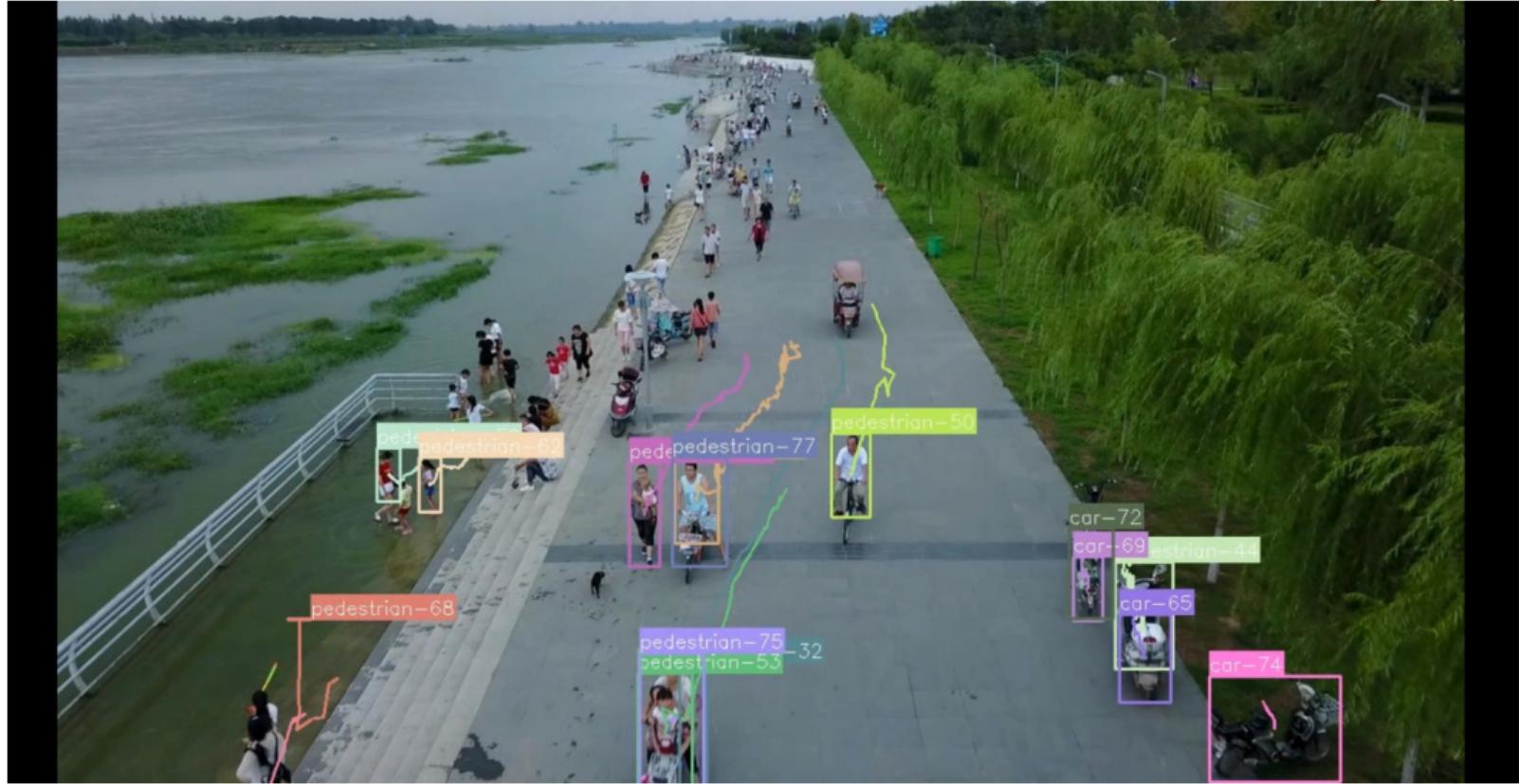
Paper Title	Author	Algorithm and Methodology	Key Contribution
Multi-Target Tracking Based on YOLOv8 and DeepSORT	Sui et al. [3]	YOLOv8 + DeepSORT for multi-target tracking	Enhanced detection-tracking integration, improving real-time tracking performance
Multiple Object Tracking Incorporating a Person Re-identification Using Polynomial Cross Entropy Loss	Huang et al. [1]	Multi-object tracking with Person Re-ID using Polynomial Cross Entropy Loss	Improved ReID robustness & tracking precision with novel loss function
Enhanced DeepSORT and StrongSORT for Multicattle Tracking with Optimized Detection and Re-identification	Sim et al. [2]	Enhanced DeepSORT & StrongSORT for multi-object tracking	Optimized detection & ReID for improved tracking accuracy in multi-cattle scenarios

- The VisDrone-MOT dataset includes 56 training, 17 testing, and 7 validation video sequences, with respective annotations
- Annotations are text files with frame ID, object ID, bounding box(x, y, width, height), score, category, occlusion, and truncation
- Captured from UAVs in urban and suburban environments, featuring pedestrians, vehicles, and motorcyclists
- Challenges include scale variations, fast motion blur, occlusions, similar-looking objects, and weather/lighting changes, impacting accurate tracking

Our Approach



Results



- Exploring Alternative ReID Models to improve tracking performance by Enhancing Object Association
- Adapting to Motion Variations to improve robustness against sudden object movements
- Integration with Advanced Detection Methods to combine Re-ID with improved object detection models for better accuracy
- Optimization for Real-Time Tracking to enhance speed and efficiency for real-world UAV applications

References

- [1] Shao-Kang Huang, Chen-Chien Hsu, and Wei-Yen Wang. *Multiple Object Tracking Incorporating a Person Re-identification Using Polynomial Cross Entropy Loss*. IEEE Access, 2024.
- [2] Hyeon-seok Sim and Hyun-chong Cho. *Enhanced DeepSORT and StrongSORT for Multicattle Tracking with Optimized Detection and Re-identification*. IEEE Access, 2025.
- [3] QiFeng Sui. *Multi-Target Tracking Based on YOLOv8 and DeepSORT*. IEEE 6th International Conference on Internet of Things, Automation and Artificial Intelligence (IoTAAI), 2024.