Abstract

This project focuses on player/person re-identification in a single camera feed using advanced object detection and tracking algorithms. The system employs a custom-trained YOLOv11 model and DeepSORT tracker to assign and maintain consistent IDs for each individual, enabling accurate monitoring across frames in a single continuous video stream.

Introduction

Re-identification (Re-ID) is a critical task in video surveillance and sports analytics where consistent labeling of individuals over time is essential. Our approach applies the cutting-edge YOLOv11 detector with DeepSORT to ensure stable tracking even under occlusions or re-appearances. This is particularly useful in scenarios like sports videos, security footage, or crowd analysis.

Methodology

- YOLOv11: A custom-trained model based on the best-performing checkpoint (`best.pt`) was used for accurate person detection.

- DeepSORT: Ensures identity persistence across frames using motion and appearance features.

- OpenCV: Handles video reading, writing, and overlaying bounding boxes and tracking IDs.

- Annotated output provides clear visualization for downstream analytics.

Implementation

- Input: Single-feed video file (`.mp4`)

- Output: Video with tracked individuals and consistent IDs (`output_tracking.mp4`) - Main Script: `tracker.py`

- Model Checkpoint: `best.pt` trained using annotated player/person data

- Dependencies managed via `requirements.txt`

- Git LFS used to handle large model weights

Challenges

- Managing detection accuracy under motion blur and overlapping players

- Ensuring identity stability under partial occlusion

- Handling large `.pt` weight files in version control systems

Future Work

- Incorporating appearance-based Re-ID modules for enhanced accuracy

- Deploying the system on edge devices for real-time analysis

- Extending to multi-camera tracking with Re-ID consistency

Conclusion

This re-identification system shows how modern detection and tracking techniques like YOLOv11 and DeepSORT can be integrated to provide consistent and accurate tracking in a single video feed. The use of a custom `best.pt` model enables robust detection, paving the way for further advancements in surveillance and sports video analytics.

Output Screenshot

Below is a visual output frame showing best.pt detections and DeepSORT tracking results:
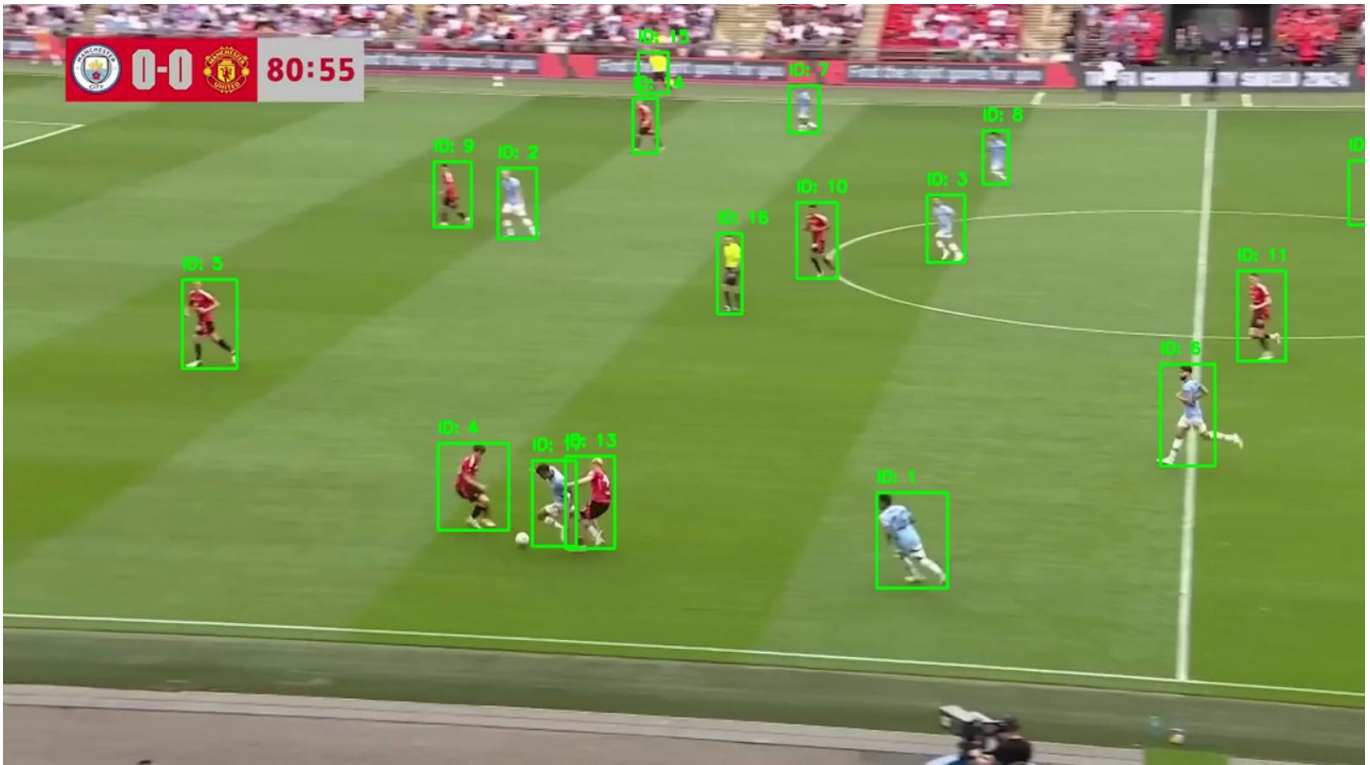
Video Demonstration

The annotated video output demonstrating re-identification has been included separately as a file: Screen Recording 2025-07-08 054238.mp4.

https://drive.google.com/file/d/15Rr3gSvycw_YmMtwhg53PZgYh4qhJK6L/view?usp=sharing