Player Re-Identification Using YOLOv11 and DeepSORT

The project uses a combination of “YOLOv11” and “DeepSORT” to perform real-time player tracking on a football match video. The steps followed were:

1. Approach and Methodology

- Object Detection: YOLOv11 (‘best.pt’ model) was used to detect players in each frame. Class ‘0’ was assumed to correspond to "player".

- Tracking: DeepSORT was initialized with ‘mobilenet’ as the embedder to maintain consistent IDs based on both motion and appearance features.

- Video Processing: Each frame was resized to a fixed resolution (1280×720) for consistency. Output video was saved with bounding boxes and player IDs.

- Visualization: Each player was shown with an ‘ID:’ label. This ID remained constant for that player as long as they stayed in the frame.

2. Techniques Tried and Their Outcomes

- Lowered confidence threshold (0.2): Improved detection of players who were small or partially visible.

- DeepSORT appearance embedding (`mobilenet`): Helped improve tracking consistency across frames.

- Parameter Tuning:

- ‘max_age = 60’: Allowed the tracker to keep the ID active for players who briefly disappeared.
- ‘nn_budget = 100’: Balanced memory usage and matching quality.

Outcome: These changes made the tracking more robust, especially in crowded or dynamic frames.

3. Challenges Encountered

- Missed Re-Identification on Return: When players exited and re-entered the frame, they were sometimes assigned a new ID. True re-identification remains a challenge without long-term memory or re-ID dataset training.

- Bounding Box Accuracy: In some cases, the bounding boxes were tight or off-center, likely due to limitations in training data or YOLO tuning.

- Model Performance: Detection and tracking occasionally lagged due to resource constraints on the local machine during real-time playback.

Conclusion

The system achieves stable, real-time player tracking within a single 15-second video. Unique IDs are maintained during visibility, and the method serves as a solid foundation for further development in multi-object tracking and re-identification.