

Player Re-Identification in Sports Footage - Project Report

1. Approach and Methodology

The project focuses on re-identifying players in sports footage, both within a single video stream and across multiple camera views. The core methodology combines object detection with re-identification using deep learning. YOLOv8 is used for detecting players, while a re-identification module (currently with a placeholder for feature extraction) assigns unique IDs based on visual features.

The implementation includes player tracking logic, where players are assigned consistent IDs across frames. For cross-camera re-identification, the framework is extended to simultaneously process two video streams and match detected players by comparing their feature embeddings.

2. Techniques and Outcomes

- **Object Detection:** YOLOv8-based model accurately detects players and other elements in sports video.
 - **Re-Identification:** A placeholder model currently returns random feature vectors. However, the structure is in place to integrate a real re-identification model.
 - **Tracking:** A `PlayerTracker` class maintains identity across frames using feature similarity.
 - **Outputs:** Three types of video outputs are generated:
 - Single feed video with re-identified players.
 - Broadcast video with initial cross-camera detection.
 - Tacticam video with initial cross-camera detection.
 - **Outcome:** The system successfully demonstrates player tracking in single-feed videos and sets up the architecture for cross-camera mapping.
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3. Challenges Encountered

- **Feature Extraction Model:** The absence of a trained feature extractor limits real-world re-identification accuracy.
- **Cross-Camera Matching:** Matching across views is difficult due to different perspectives, lighting, and occlusions. The logic exists but needs enhancement.
- **Real-time Processing:** The current implementation is not fully optimized for real-time performance and may require GPU acceleration for production use.
- **Data Variability:** Variations in jersey colors, player poses, and motion blur affect detection and ID assignment quality.