

# Player Identity Mapping Report

## Approach and Methodology

The objective of this project was to assign consistent player identities across two video feeds-broadcast and tacticam-using a YOLOv11 model fine-tuned for player and ball detection. The process involved detecting, tracking, extracting appearance features, and matching players across views.

### 1. Detection:

- Used YOLOv11 to detect players (class 0) in each frame of both videos.

### 2. Tracking:

- Applied Deep SORT to maintain consistent short-term IDs within each video.

### 3. Feature Extraction:

- Extracted HSV color histograms from cropped player images as appearance descriptors.

### 4. Matching:

- Used cosine similarity on averaged histograms to match players from tacticam to their counterparts in broadcast.

### 5. Visualization:

- Annotated videos were generated with bounding boxes and consistent player IDs using OpenCV.

## Techniques and Outcomes

- YOLOv11 for detection: Provided accurate player and ball localization.
- Deep SORT: Enabled consistent tracking across frames, avoiding frequent ID switches.
- HSV histograms: Efficient and simple feature for appearance comparison.
- Cosine similarity: Used for nearest-match identity assignment between views.

Outcome: Successfully mapped and visualized player IDs across both views, producing annotated video outputs.

## Challenges Encountered

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- Varying viewpoints and lighting conditions made feature matching less reliable in some cases.
- Players with similar appearance (e.g., identical kits) confused histogram-based matching.
- Initial tracker warm-up frames sometimes assigned wrong IDs before stabilizing.
- Frame-by-frame processing is computationally expensive; optimization could improve speed.