Football Player Re-Identification - Project Report

Approach and Methodology

We used a two-stage pipeline:

1. Detection with YOLOv11 to get player bounding boxes.

2. Feature extraction + cosine similarity (ResNet18) for re-identification across frames.

Each player is matched to existing identities or assigned a new one if no match is found.

Techniques Used

- YOLOv11: Fast and accurate object detector.

- ResNet18: Pretrained model from torchvision, used to extract 512-D features from player crops.

- Cosine similarity: Used to match player features across frames.

- Duplicate ID prevention: Ensured same ID wasn't reused within the same frame.

- last_seen tracker: Used frame_no to track if a player disappeared and later reappeared.

Challenges Encountered

- Similar player appearances resulted in some ID mismatches.

- Required careful logic to avoid assigning the same ID to multiple players in the same frame.

- Cropping and resizing had to be managed to avoid feature distortion.

Future Improvements

- Use more advanced ReID models like OSNet or ResNet50.

- Add Deep SORT to combine motion + appearance tracking.

- Use jersey number OCR for fallback identity.

- Improve temporal consistency with trajectory modeling.

Outcome

- Achieved consistent ID tracking for players who left and re-entered the frame.

- Code is modular, documented, and efficient for real-time processing.