Player Re-Identification Project Report

1. Approach and Methodology

- Used YOLOv11 for real-time object detection focused on class 'Player'.
- Integrated Deep SORT with MobileNet appearance embeddings for Re-Identification (Re-ID).
- Tracked player identities across frames with persistent Track IDs.
- Used confidence threshold and bounding box validation to ensure clean detections.
- Displayed Track IDs on the frame and live logs on terminal for verification.

2. Techniques Tried and Their Outcomes

Technique	Outcome
YOLOv11 + Deep SORT	Working pipeline with tracking
Custom filters (IoU check)	Reduced false detections
ID smoothing / stitching	Not implemented yet
Custom training / fine-tuning	Out of scope
Jersey Number detection	Not implemented (bonus idea)

3. Challenges Encountered

- ID switches due to similar-looking players and occlusions.
- Track IDs sometimes shot up to 50+ due to re-identification failure.
- YOLO occasionally missed players when motion blur occurred. - Slow rendering in OpenCV live display.
- Limited training access and short video clip restricted evaluation.

4. If Incomplete, What Remains and Future Plan

- Enhance YOLO model with player-specific fine-tuning.
- Integrate jersey number OCR to stabilize identity.
- Use ID stitching / smoothing logic over frames.

- Switch to TensorRT or ONNX for faster inference.
- Test with longer match clips to verify ID persistence and robustness.
- Add player stats export or match analytics summary as future upgrade.