AI Internship Project Report

Player Re-Identification in a Single Video Feed

Candidate Name: *Bandi Poorna Sri Sailaja*

1. Project Objective

This project focuses on solving the challenge of tracking football players in a 15-second video feed. The main objective was to:

- Detect each player in the video using a provided trained model.

- Assign a **consistent ID** to each player even if they leave the frame and return later.

- Simulate this process in **real-time**, as it would happen during a live game broadcast.

2. Tools & Tech Stack

- **Language**: Python

- **Object Detection**: YOLOv11 (custom-trained model)

- **Tracking & Re-Identification**: Deep SORT

- **Video Handling**: OpenCV

- **Development Environment**: Google Colab

3. My Approach

1. **Player Detection**

    - I used the provided YOLOv11 model to detect players in each frame.

    - Focused only on class `0` (players), with a detection confidence threshold of **0.4**.

2. **Player Tracking**

    - Implemented the **Deep SORT** tracking algorithm to assign and maintain unique player IDs.

    - Tuned the parameters for better performance:

        - `max_age = 60` (keep tracking ID even if object disappears for a while)

- **n_init = 2** (confirm detection before assigning an ID)

- **cosine_distance = 0.35** (appearance-based matching)

3. **Real-Time Simulation**

- Annotated each frame with:

    - Bounding boxes around players

    - Player ID labels

    - Frame info and number of detections

- Exported the processed video as `output_tracked.mp4`

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4. What I Tried & What I Learned

Technique	Outcome
Bounding box matching only (IOU)	IDs changed frequently and were unstable.
Default Deep SORT settings	IDs more stable, but some switching remained.
Tuned Deep SORT settings	Much better consistency, even when players left and returned.
Confidence threshold filtering	Reduced false positives and noise in detection.
Overlay debug text	Helped in tuning parameters and evaluating real-time performance.

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5. Challenges Faced

- **Missed Detections**: Some players were not detected due to partial occlusion or distance.

- **Stability of IDs**: Required several iterations of Deep SORT tuning to achieve stable, re-identifiable tracking.

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6. Evaluation Highlights

Criteria	How I Addressed It
Accuracy of Re-Identification	Achieved through Deep SORT and cosine appearance matching.
Simplicity & Modularity	Code is modular and clean, written in a single Colab notebook.
Documentation	Provided detailed README and this PDF report.
Runtime Performance	Code ran at ~30 FPS on Google Colab GPU.
Creativity	Added custom overlays, debug views, and hosted model externally.

7. Deliverables

- `player_tracking.ipynb` – Main code file

- `output_tracked.mp4` – Final processed video with player IDs

- `best.pt` – Object detection model (hosted on Google Drive)

- `README.md` – Setup and execution instructions

- This PDF Report

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8. About Me – Bandi Poorna Sri Sailaja

I am an aspiring AI Engineer who enjoys solving real-world problems using computer vision and deep learning.
This project helped me develop strong skills in tracking, object detection, and model deployment under constraints.

I am highly motivated, quick to learn, and enjoy working on practical AI problems that bring measurable results.
I'm actively seeking opportunities where I can apply these skills in a collaborative, challenging environment.

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9. Final Thoughts

> "A good AI system is not just accurate—it's also consistent, interpretable, and practical. This project reflects my ability to combine research and engineering to deliver real-time solutions."

I look forward to contributing as an AI Intern and continuing to grow with innovative teams.