

Soccer Player Re-Identification – Final Report

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1. Approach and Methodology

The goal of this project was to perform player re-identification from a single 15-second soccer video feed.

The pipeline consisted of three major modules:

- Detection: YOLOv11 pre-trained weights were used to detect players in each frame.
- Tracking: DeepSORT was used for temporal consistency and tracking of detected players.
- Re-Identification: Color histogram features were extracted for each player, and cosine similarity was used to maintain consistent IDs.

2. Techniques Tried and Their Outcomes

- YOLOv11 for Detection: Successfully detected all players in real-time.
- DeepSORT Tracker: Provided a baseline temporal ID, but struggled with ID consistency across disappearances.
- Color Histogram + Cosine Similarity: Helped in correcting inconsistent IDs post occlusion or re-entry.
- Debug Visualization: Added colored boxes and live frame annotation to validate ID accuracy frame-by-frame.

3. Challenges Encountered

- ID Instability: Initially, DeepSORT alone assigned different IDs when players left and re-entered the scene.
- Feature Sensitivity: HSV color histograms could sometimes be sensitive to lighting changes or shadows.
- Video Compression Artifacts: Slight blurring made feature extraction less accurate.
- False Positives: Occasionally, the ball or referees were misclassified as players.

4. Improvements and Future Scope

- Implement deep feature embeddings (e.g., ResNet-50) for robust appearance modeling.
- Use jersey number detection for identity reinforcement.
- Improve re-ID logic with temporal smoothing (e.g., optical flow).
- Evaluate frame-level performance metrics (mAP, ID switches) for quantitative reporting.

5. Conclusion

The re-identification system is functional and meets the assignment requirements. It can maintain consistent player identities in a single-camera scenario with a decent degree of accuracy. A lightweight visual re-ID technique (color histogram + cosine similarity) was sufficient given the project's time and resource constraints.