Player Re-identification using YOLOv8 and SORT

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Objective

The objective of this assignment is to detect and track players in a sports video using a trained YOLOv8 model and SORT tracking algorithm. The goal is to ensure that the identity of each player is maintained even when they move out of the frame and return.

Step-by-Step Explanation

1. Model Loading

A pretrained `best.pt` model (provided by the company) is loaded using the `ultralytics` library. This model is fine-tuned for player detection.

2. Test Video Input

A custom sports video was uploaded for testing the model. The model detects players frame-by-frame and stores predictions in the `runs/detect/predict` folder.

3. Player Tracking using SORT

The SORT algorithm is used to assign a unique ID to each detected player. It ensures that players keep the same ID even if they temporarily go out of frame.

4. Re-identification (ReID)

Each player's cropped image is extracted from the frames and passed through an EfficientNet-B0 model to extract deep features. Players with similar features are grouped using cosine similarity, ensuring reliable re-identification.

5. Output Generation

The final video `final_output.avi` includes bounding boxes with unique IDs that are consistently maintained. This output visually verifies correct tracking and re-identification.

Tools and Technologies Used

- **YOLOv8**: For object detection.
- **SORT**: For object tracking.
- **EfficientNet-B0**: For feature extraction and ReID.
- **OpenCV & NumPy**: For video processing.
- **PyTorch**: For deep learning inference.

Conclusion

The solution accurately detects and tracks players while maintaining their identity. The final output meets the objective and can be extended to support more robust ReID pipelines for sports analytics.