A Brief Report on

Re-Identification in Single Camera Feed

by

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Submitted to: Stealth Corporation

Re-Identification in Single Camera Feed

Project Overview

- Performs object re-identification (Re-ID) in a single-camera video.
- Uses a custom-trained YOLOv8 model for detecting and tracking players.
- Maintains consistent identity for each player even after occlusion or re-entry.

Objectives

- Detect and track objects like players (and optionally a ball).
- Assign unique, persistent IDs across video frames.
- Draw annotated bounding boxes and labels.
- Log tracking details to a CSV file.
- Analyze how long each object appeared.

Approach and Methodology

- Load a YOLOv8 model (e.g., `best.pt`) for object detection.
- Detect persons in each frame using Ultralytics YOLO.
- Pass detections to Deep SORT for ID assignment and tracking.
- Track objects based on both motion and visual appearance.
- Save output video and generate CSV log.

Techniques Tried and Outcomes

- **YOLOv8n**: Fast but unstable; ID switching observed.
- **YOLOv8s**: Improved detection and tracking stability.
- **Deep SORT tuning**:
    - Increased `max_age` for longer memory.
    - Lowered `max_cosine_distance` for better Re-ID accuracy.
- **Confidence thresholding** reduced false positives.
- Outcome: Mostly stable IDs, but occasional switches still occurred.

Hard Challenges Encountered

- ID switching for the same player due to jittery detection boxes.
- False detections in background regions.
- Output video corruption if writer wasn't properly closed.
- Re-ID failures during long occlusions or fast movements.

What’s Incomplete / Future Work

- Currently supports only single-camera tracking.
- No advanced appearance embedding (like OSNet or StrongSORT).
- Ball tracking is less reliable than player tracking.
- No real-time dashboard for analysis.
- Future ideas:
    - Use StrongSORT with OSNet for better Re-ID.
    - Add cross-camera re-identification.
    - Display analytics (duration on field, heatmaps, speed).