

CSE573 - Computer Vision and Image Processing

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Progress Report #1

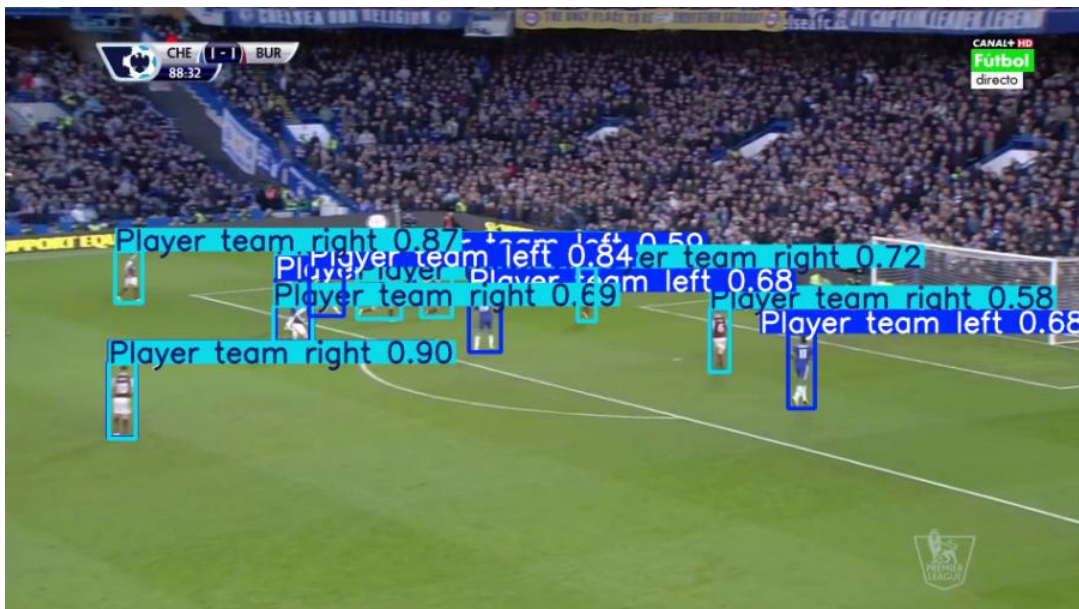
Progress to Date

1. Dataset Preparation:

- Successfully downloaded and extracted the SoccerNet-v3 dataset, including Frames-v3.zip and Labels-v3.json.
- Converted SoccerNet annotations (Labels-v3.json) into YOLO format and organized the dataset into the required folder structure.
- Verified that all images have corresponding annotation files in YOLO format.

2. Player Detection:

- Fine-tuned YOLOv8 Nano (yolov8n.pt) on the SoccerNet-v3 dataset for player detection.
- Achieved successful detection of players in soccer frames with bounding boxes and confidence scores.
- Saved detection results as output_detection.png and verified performance visually.



3. Code Implementation:

- Developed Python scripts for:
 - Dataset preparation (Frames-v3.zip extraction and annotation conversion).
 - Training YOLOv8 on SoccerNet-v3 (train_yolo() function).
 - Testing player detection using fine-tuned YOLOv8 (test_yolo() function).

Changes to the Original Proposal

1. Field Line Detection Removed:

- Initially planned to detect field lines using YOLOv8 for perspective transformation. However, this step was removed after realizing that player detection and manual calibration are sufficient for offside detection.

2. Focus Shift to Offside Detection:

- Adjusted the project scope to prioritize offside detection logic using player positions and team classification rather than comprehensive field mapping.

Planned Tasks

1. Team Classification:

- Implement HSV-based jersey color segmentation to classify players into teams (e.g., "Team A" and "Team B").

2. Perspective Transformation:

- Compute homography matrix using manually selected reference points to map player positions to normalized soccer field coordinates.

3. Offside Detection Logic:

- Develop a rule-based system to determine offside violations based on FIFA regulations:
 - Identify the second-to-last defender's position.
 - Compare attacking players' positions relative to the defender.

4. Testing Pipeline:

- Integrate all components (player detection, team classification, perspective transformation, offside logic) into a single pipeline.
- Test the pipeline on additional matches from SoccerNet-v3.

5. Performance Evaluation:

- Measure precision, recall, and FPS for player detection and offside decision-making.
- Optimize code for real-time performance on consumer hardware.

Schedule Through Project Completion

Task	Start Date	End Date	Status
Dataset Preparation	March 13, 2025	March 17, 2025	Completed
Player Detection Fine-Tuning	March 18, 2025	March 23, 2025	Completed
Team Classification	March 25, 2025	March 27, 2025	Planned
Perspective Transformation	March 28, 2025	April 1, 2025	Planned
Offside Detection Logic	April 2, 2025	April 6, 2025	Planned
Pipeline Integration	April 7, 2025	April 10, 2025	Planned
Testing & Performance Eval	April 11, 2025	April 15, 2025	Planned