SDAIA
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Soccer Object detection using YOLO

Players, ball, and match referee detection

Roadmap

- The YOLOv8 Nano model has been chosen for implementation, considering the available time and GPU
- The YOLOv8 Nano will be utilized as pre trained model to detect player , ball and match referee then evaluate
- Fine tune the pretrained model to improve the accuracy
- Application on streaming video using cv2
- Model optimization using quantization and pruning

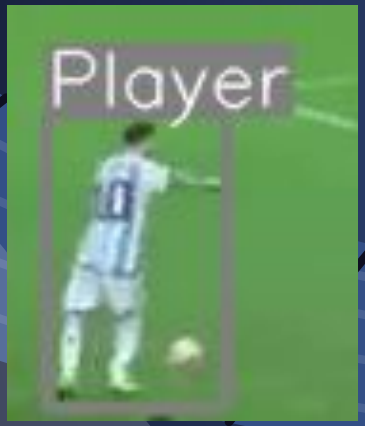
Applications:

- Sports Analytics
- Automated Highlight Reels
- Training and Scouting Tools

About the dataset:

- Size : 150 image
- Data split : 103 train set , 28 valid set and 19 for test
- Data Augmentation : Resizing to 640x640
  Classes : Ball, player, and Ref

Dataset Examples

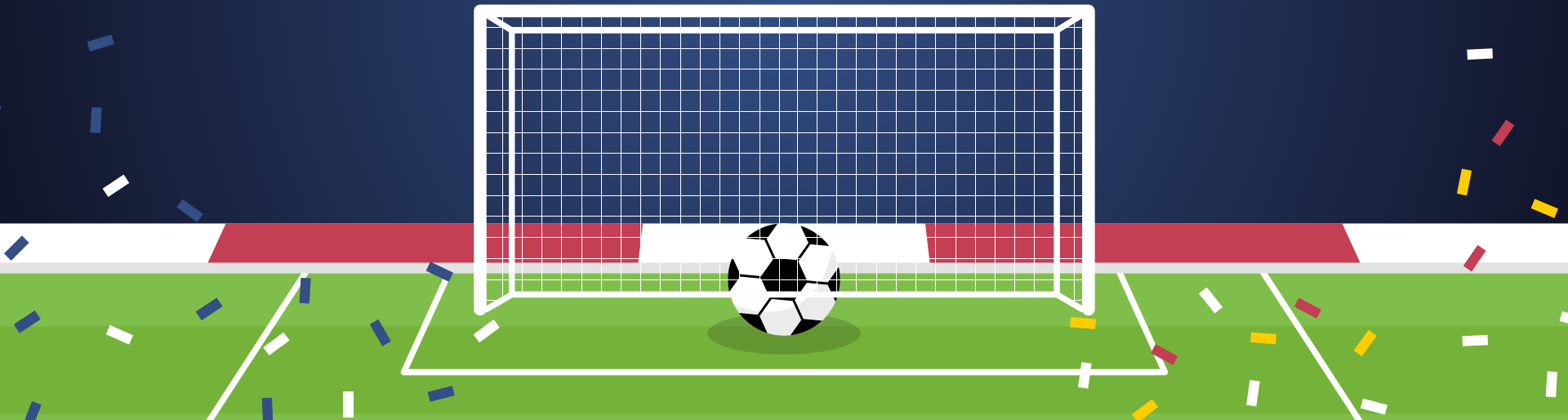


YOLO Algorithm implementation

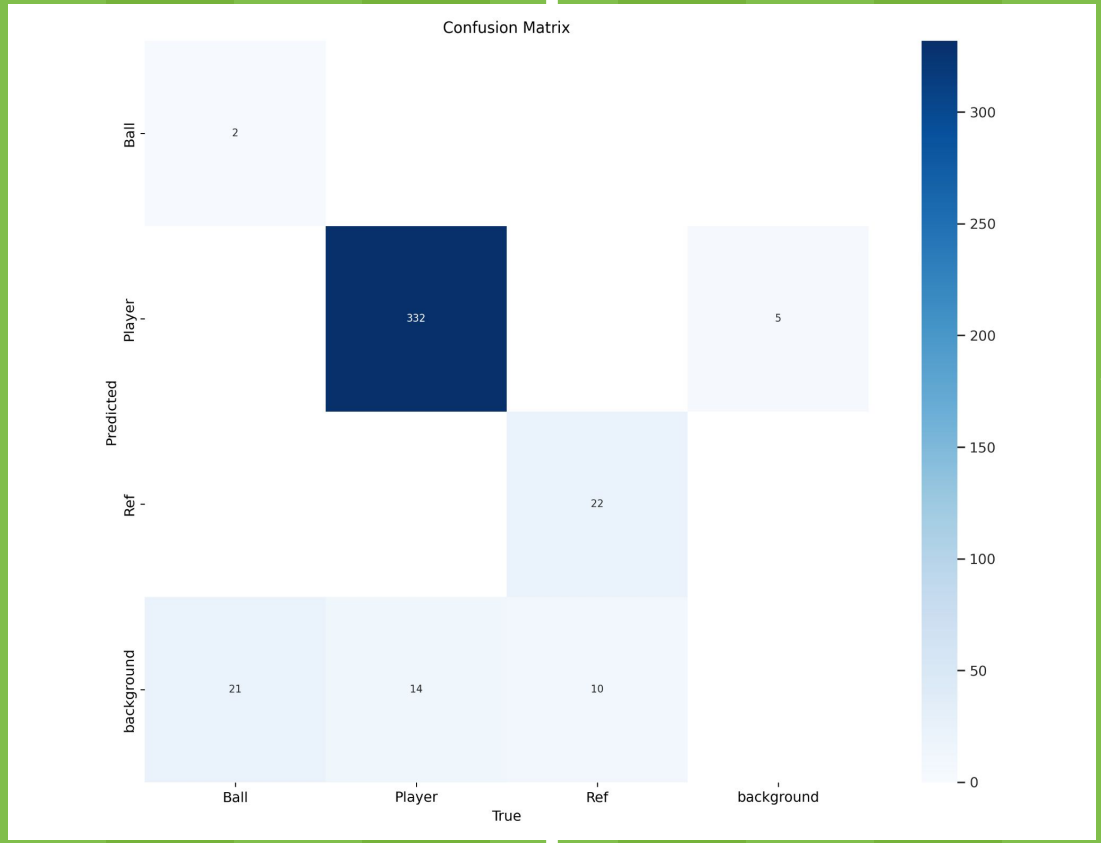
We trained the yolov8 model on our dataset using the following parameters:

`imgsz=640 - batch=64 - epochs=100 - patience=50`

`Result: mAP50 = 80%`



Trained Model 's Confusion Matrix

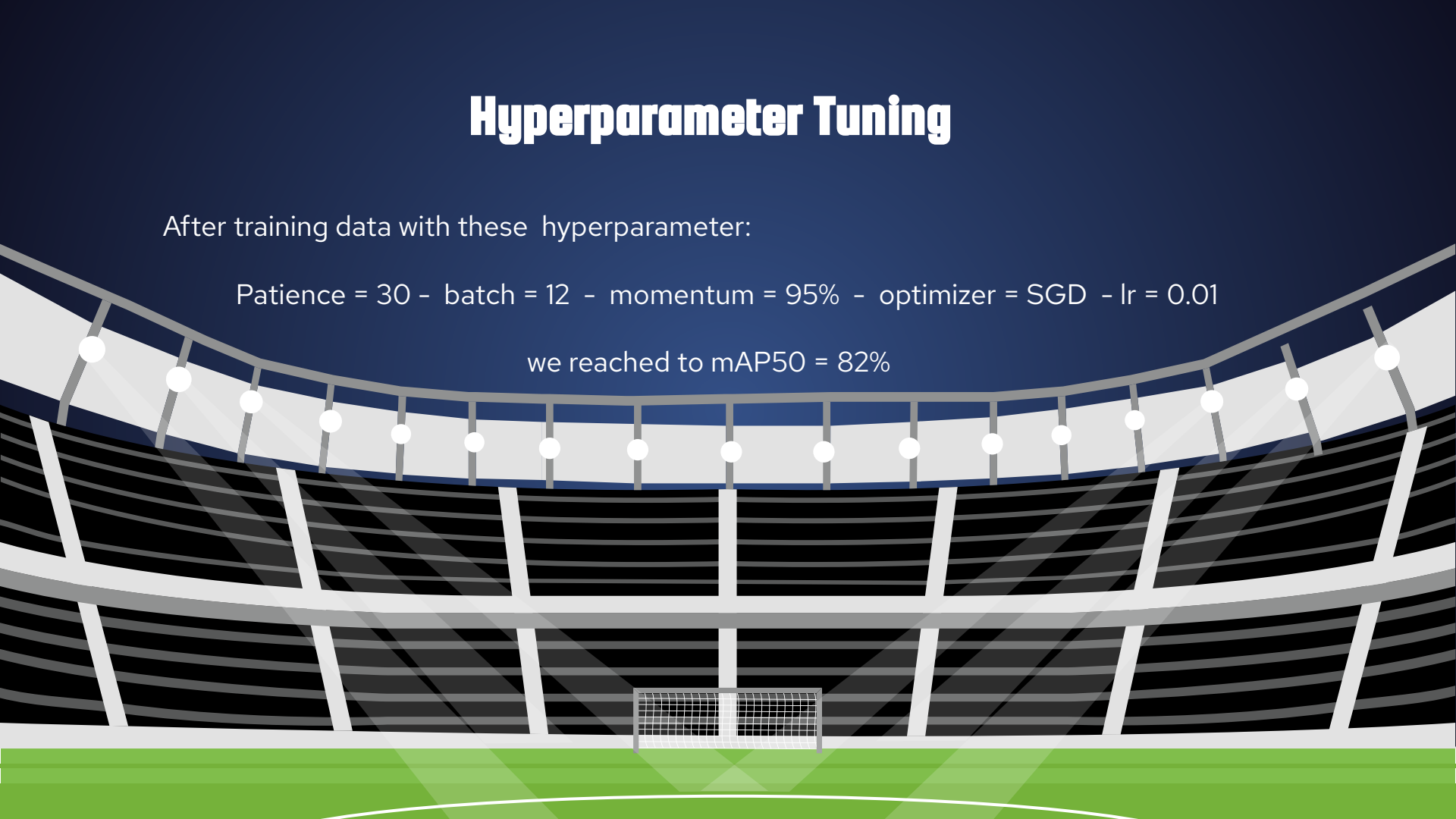


Hyperparameter Tuning

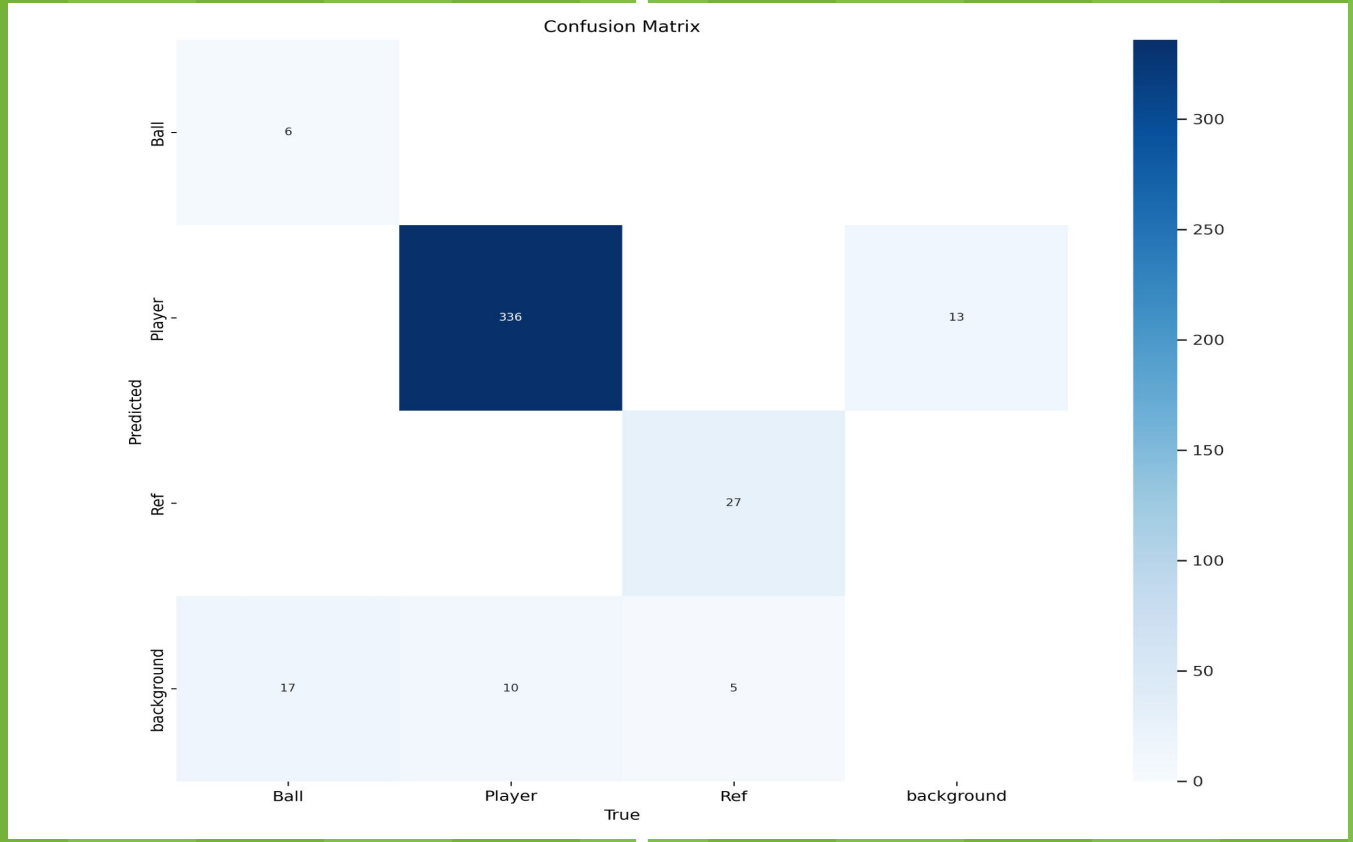
After training data with these hyperparameter:

Patience = 30 - batch = 12 - momentum = 95% - optimizer = SGD - lr = 0.01

we reached to mAP50 = 82%



Tuned Model 's Confusion Matrix



Application on video streaming

- We used CV2 for video streaming
- Then used CV2 capture on a downloaded MP4 file
- Streamed the video and the model’s object detection in real time

Model Optimization and Speed Improvement

We experimented with **quantization** technique to reduce inference time and reached **mAP50 = 82%**

THANK YOU

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