

# Lab 11: Real-Time Object Detection (YOLOv8, SSD, MobileNet – OpenCV DNN)

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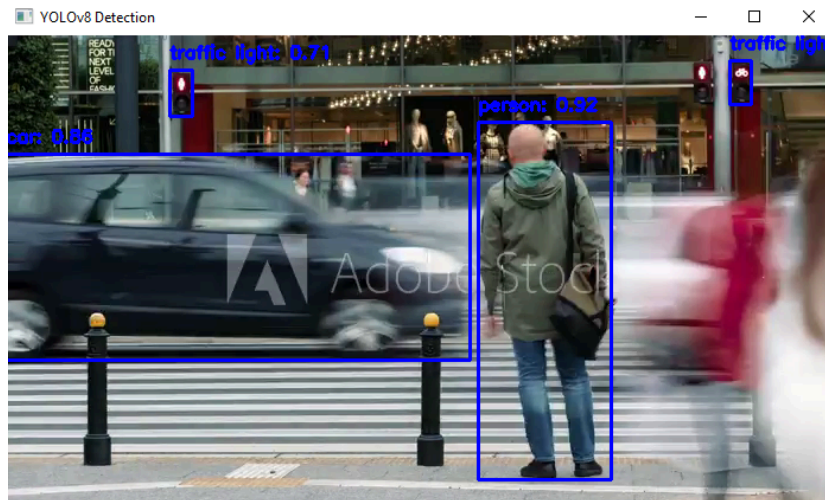
Github-[Link](#)

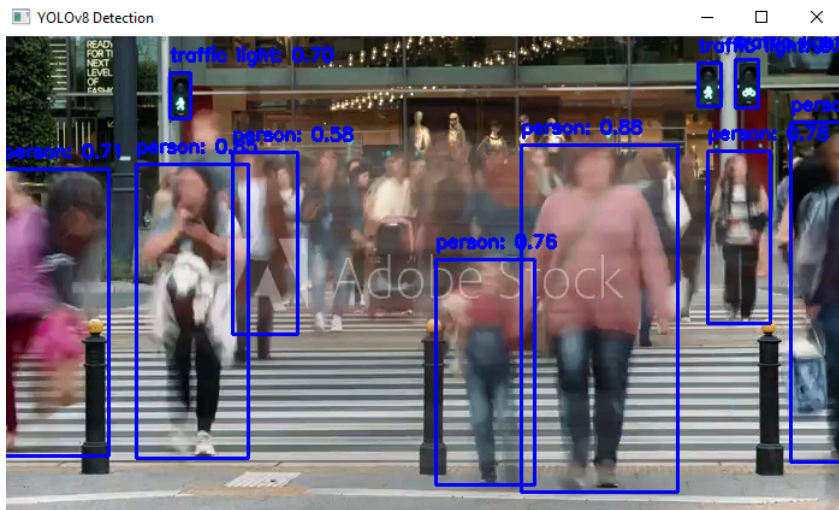
## Objective

- Implement real-time object detection using pretrained deep learning models.
- Learn to process live video streams and visualize bounding boxes and class labels.
- Compare models and evaluate performance.

## YOLOv8 Real-Time Detection (Ultralytics)

Screenshot of Detection:



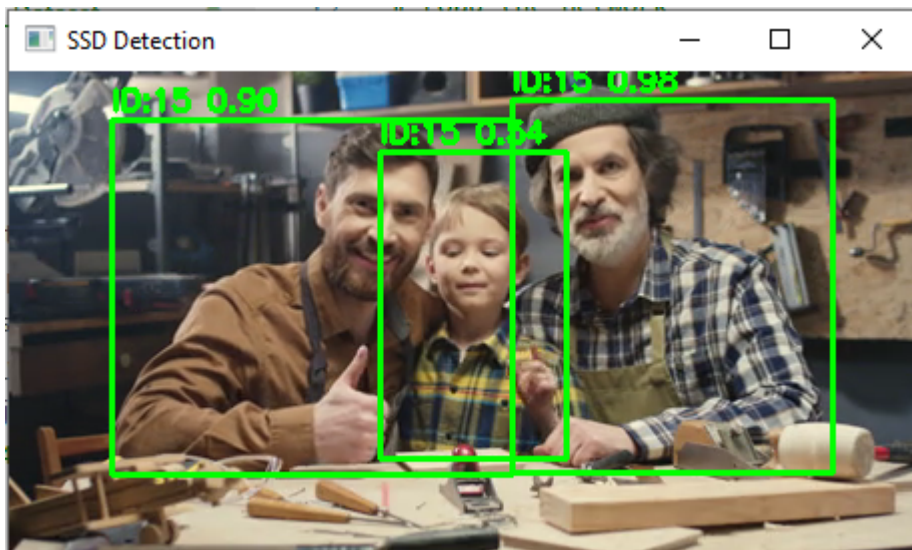


#### Interpretation:

- YOLOv8 detects multiple objects in real-time with high accuracy.
- Suitable for real-time applications due to low latency.

## SSD + MobileNet Real-Time Detection

#### Screenshot of Detection:



#### Interpretation:

- Lightweight SSD + MobileNet model detects objects with lower computational cost.
- Slightly less accurate than YOLOv8 but suitable for CPU-only devices.

# YOLOv8 ONNX with OpenCV DNN

Code:

Interpretation:

- Demonstrates CPU/GPU deployment using ONNX.
- Compatible with devices without Ultralytics package.

## Suggested Exercises

### 4.2 Benchmark SSD vs YOLOv8 FPS

Notes:

- Measure frames per second (FPS) using `time.time()`.
- Compare speed on same device.

```
SSD FPS: 6.55  
YOLOv8 FPS: 1.40
```

## Summary

- YOLOv8 provides ultrafast, highly accurate detection suitable for real-time applications.
- SSD + MobileNet is lightweight and suitable for CPU-only devices.
- OpenCV DNN allows deployment of ONNX models across different hardware.
- Fine-tuning models enables custom object detection.
- Benchmarking FPS helps evaluate trade-off between speed and accuracy.