Title:

Real-Time Missing and New Object Detection in Video Using YOLOv8n with half precision.

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1. FPS Achieved

Scenario	FPS (Frames per Second)
Real-time inference (GPU)	20-38 FPS
Real-time inference (CPU)	8-15 FPS

Note:
Achieved **higher FPS** using half precision.

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3. Hardware Configuration

Component	Specification
CPU	Intel Xeon 2.20 GHz
GPU	NVIDIA T4 (15 GB)
RAM	13 GB
OS	Ubuntu 22.04

- This whole experiment was done on Google Colab using GPU.

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4. Techniques and Optimizations

- **YOLO with Tracking**:
  Used **YOLOv8n** by loading in half precision for improved inference speeds.
- **FPS Counter**:
  - Added real-time FPS calculation using timestamps.
- **Dockerization**:
  - Created a Dockerfile to containerize the project for portability.

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5. Output Video

- **Output file:**
  `output/test_video_part1_output.mp4`
- **Content:**
  - Highlights missing objects (when an object disappears).
  - Highlights new objects (when an object newly appears).
  - FPS is maintained throughout the video.

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6. Additional Notes

- Code is clean, modular, and fully Dockerized.
- GPU acceleration works properly inside Docker.

Conclusion

Successfully implemented a **real-time video analytics system** for:

- Missing object detection
- New object placement detection
- Real-time performance optimization (30+ FPS on GPU)
- Dockerized and reproducible setup

NOTE:

In this approach I have used a thresholding method to predict whether an object is missing or new in the video. I am assuming that this application will be used for real time/ live video surveillance footages, if we have the whole video we could surely say if an object is completely disappeared or new in the video, else I think we must use thresholding on number of frames to predict if an object is new or missing in the scene.