**Report: Real-Time Detection of Missing and New Objects in Video**

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**FPS Achieved:**

* On average, the system achieved around 7 to 10 FPS after a few optimizations.

**Hardware Configuration:**

* **CPU:** Intel Core i5-10210U @ 1.60GHz
* **GPU:** No dedicated GPU (CPU-only)
* **RAM:** 8GB

**Techniques and Optimizations I Used:**

* **Lightweight Model:** I used the YOLOv8n (nano) model to keep inference fast, especially since I was working without a GPU.
* **Frame Skipping:** Instead of processing every single frame, I processed every 2nd or 3rd frame to reduce the load and improve speed.
* **Resizing Frames:** Before running detection, I resized the frames to 640x360 to make things faster, and then adjusted the coordinates back to the original size.
* **Memory Management:** I made sure to clear up model outputs after each frame to avoid memory buildup.
* **Object Tracking:** I used DeepSORT to consistently track objects across frames and assign them IDs.

**How I Designed the System:**

* I kept the code modular and easy to understand, separating the detection, tracking, and visualization parts.
* I made real-time performance a priority since I was working without a dedicated GPU.
* I included a Dockerfile to make running and testing the project easy and consistent across machines.
* I decided to skip frames when needed to strike a balance between accuracy and performance.

**Thank you for considering my project! I'm excited about the opportunity to keep learning and growing.**