Traffic Flow Analysis Task

Objective

Develop a Python script to analyze traffic flow by counting vehicles in three distinct lanes using computer vision. The script must track vehicles across frames and maintain separate counts for each lane.

Requirements

1. Video Dataset

- **Input**: Use the traffic video at https://www.youtube.com/watch?v=MNn9qKG2UFI
- **Processing**: Download and process the video within the script

2. Core Features

- **Vehicle Detection**: Implement a pre-trained COCO model (e.g., YOLO or SSD) to detect vehicles in video frames
- **Lane Definition and Counting**: Define three distinct lanes and count vehicles in each lane separately
- **Vehicle Tracking**: Use a tracking algorithm (e.g., SORT or DeepSORT) to track vehicles across frames, preventing duplicate counts
- **Real-time Processing**: Optimize for smooth performance on standard hardware, targeting real-time or near real-time execution

3. Output Requirements

- **CSV File**: Export with Vehicle ID, Lane number, Frame count, Timestamp
- **Visual Output**: Overlay video with lane boundaries and real-time vehicle counts per lane
- **Summary**: Display total vehicle count per lane at end of processing

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Deliverables

1. Python Script: Complete, functional solution meeting all requirements
2. README File: Detailed setup and execution instructions
3. Demo Video: 1-2 minute video showcasing the system, including visual outputs
4. GitHub Repository: Well-organized repository containing all code, documentation, and demo video

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Evaluation Criteria

- Accuracy of vehicle detection
- Correctness of lane assignment and counting
- Code quality and documentation clarity
- Efficiency and real-time performance

Timeline

Complete within 7 days from assignment.

Submission

- Submit the GitHub repository link
- Include a demo video link (e.g., Google Drive)
- Provide a brief technical summary detailing the approach, challenges, and solutions