# Vehicle and Pedestrian Segmentation and Tracking

## Objective

The objective of this project is to build an end-to-end computer vision pipeline for vehicle and pedestrian segmentation and tracking. The focus is on demonstrating the workflow using annotation, segmentation, and tracking techniques rather than achieving high model accuracy.

## Dataset

A dataset of approximately 100 images was annotated using Labellerr. The images consist of scenes containing vehicles and pedestrians, providing a small but sufficient dataset to demonstrate the pipeline.

## Methodology

1. Annotation: Labellerr was used to create segmentation masks for vehicles and pedestrians.  
2. Segmentation Model: YOLOv8-seg was trained on the annotated dataset to perform instance segmentation.  
3. Tracking: ByteTrack was integrated with the YOLOv8-seg outputs to perform multi-object tracking across frames.

## Key Results and Observations

The YOLOv8-seg model successfully segmented vehicles and pedestrians in the test images. When combined with ByteTrack, consistent object identities were maintained across frames. Although the dataset was small and accuracy was limited, the workflow was successfully demonstrated.

## Conclusion and Future Improvements

This project demonstrates the complete workflow of vehicle/pedestrian segmentation and tracking using modern tools. Future improvements could include:  
- Expanding the dataset to improve model performance.  
- Applying data augmentation techniques.  
- Exploring alternative segmentation models and trackers.  
- Deploying the pipeline in real-time video processing scenarios.