# Computer Vision Pipeline: Vehicle and Pedestrian Segmentation & Tracking

## Objective

The objective of this assignment is to demonstrate an end-to-end computer vision pipeline for segmentation and tracking of vehicles and pedestrians. The emphasis is on workflow clarity rather than achieving high accuracy.

## Dataset

A dataset of ~100 images was annotated using Labellerr to generate pixel-wise segmentation masks. These annotations served as ground truth for model training.

## Methodology

1. Annotation: Labellerr was used for preparing labeled segmentation masks.  
2. Segmentation: YOLOv8-seg was trained on the dataset to detect and segment vehicles/pedestrians.  
3. Tracking: ByteTrack was applied to segmentation outputs for multi-object tracking across frames.

## Key Results & Observations

The pipeline was able to segment vehicles and pedestrians and track their movements. Despite the small dataset size, the system demonstrated how modern tools can be integrated to form a practical vision workflow.

## Conclusion & Future Work

This work successfully illustrates the segmentation + tracking workflow. Future improvements could include:  
- Using a larger and more diverse dataset.  
- Trying advanced segmentation models for higher accuracy.  
- Enhancing tracking performance in crowded or occluded conditions.