

Vision-Based Object Detection and Tracking for Autonomous Systems

Design Summary

The goal of this project was to detect and track objects in videos, such as vehicles and people. Using a pre-trained model called YOLOv8, I was able to create a program to recognize and label objects in each frame of a video.

Later, I added the capability of the program to follow each object as it moved and create a suggestion on what each vehicle should do to remain safe based on its surroundings, such as steering left or braking. This was done using DeepSORT, a tracking algorithm that gives each object a unique ID and updates its path through the video.

These results were then stored so I could analyze where each object moved. Along the way, I worked through challenges like improving accuracy, avoiding false detections (like a car being labeled as a traffic light), and figuring out how to track the movement paths of each object.

Please see the results below of the Simulated Vehicle Path and the Object Distance vs Decision graph. These show how each object moved and responded to its environment.

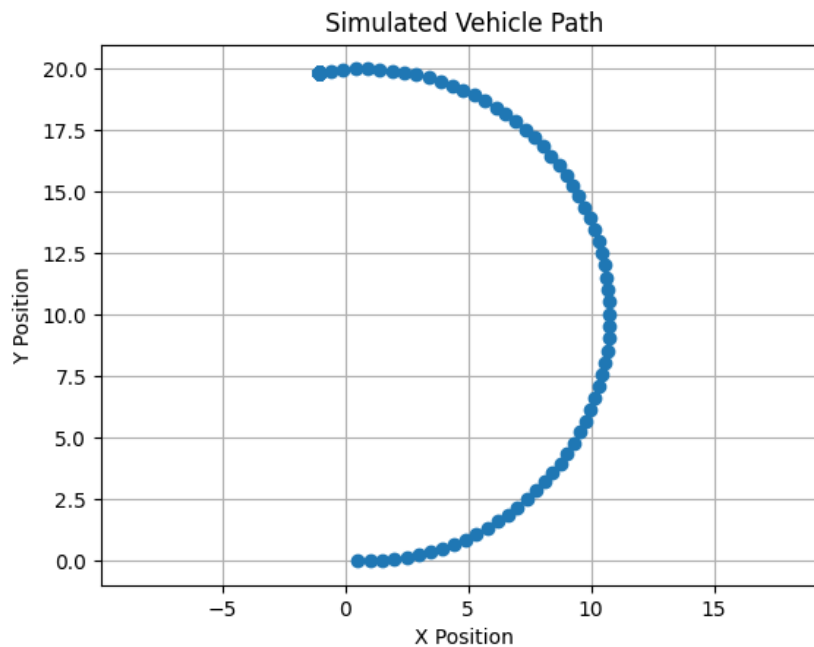


Figure 1: The simulated path of a vehicle.

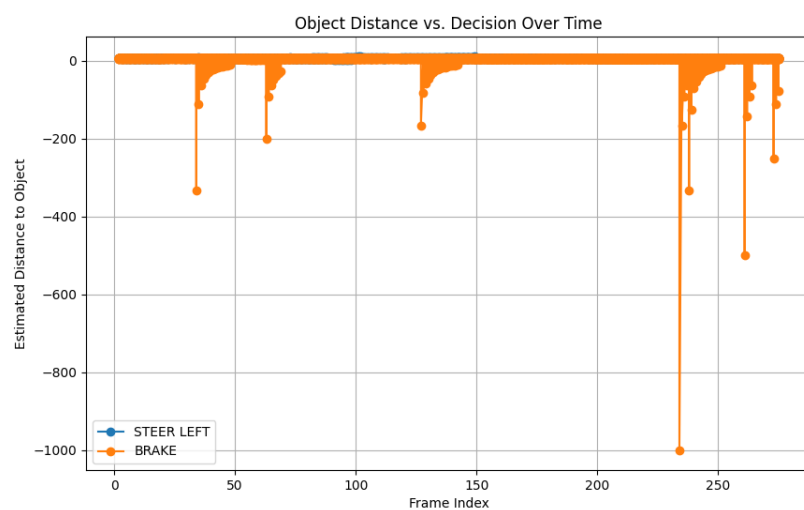


Figure 2: Object Distance vs Decision over Time.