

- 1.) Deep Learning-Driven 3D Reconstruction, Data Synthesis, and Size Estimation for Road Signs:
Most Preferred
- 2.) Reinforcement Learning for Road Sign Detection and False Positive Elimination
- 3.) Deep Learning for Estimating Lane Line Quality Using Retroreflectometer Ground Truth

I would like to work on the project Deep Learning-Driven 3D Reconstruction and Size Estimation for Road Signs as I have experience working with CNNs for object detection (e.g., YOLO and R-CNN).

Strategy:

1. 3D Sign Synthesis in Blender:

- Create different 3D road sign models, ensuring that parameters for shape, size, and position are diverse.
- Render images of road signs and export bounding box annotations and real-world size dimensions (width, height) to create a labeled synthetic dataset for training the model.

2. Deep Learning Size Estimation.

- Build a model based on training deep networks to determine specifically the sizes in dimensions on the road sign. Use Object detection models (YOLO, Faster R-CNN) to pick the road sign objects and obtain the length/width on their bounding boxes

Also experiment with semantic segmentation models to estimate sizes from the pixel area of road signs, especially for irregularly shaped signs.

3. Model Robustness and Generalization:

Augment synthetic data with changes in lighting, angle, occlusion, and distance to replicate real-world scenes so that it generalizes beyond the synthetic set.

4. Evaluation and Real-World Testing:

Evaluate models trained on this synthetic dataset to check how generalizable they will be on other real-world datasets, thereby gauging if they can approximate sign sizes well in more dynamic and random environments.