Driving Coach

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Problem Definition

- Create a program that is able to detect basic things on the road to help aid drivers in becoming more aware of their surroundings
- Objects include lanes, other cars, pedestrians, and road signs/lights

Role Within the Team

- Solo project
- Data collection, Preprocessing, algorithm application, ML Research and application

What I Implemented/Accomplished

- Originally I didn't really understand the scope of what I had to do, so my initial dataset just consisted of some videos of the road that I found from https://www.cvlibs.net/datasets/kitti/raw_data.php
  - This ended up not being sufficient later on
- Got More data from https://www.kaggle.com/datasets/sshikamaru/car-object-detection/ and https://www.kaggle.com/datasets/andrewmvd/road-sign-detection/
- Implemented a line detection through a hough transform for detecting lanes
- Trained a YOLO_NAS model with initial coco weights for cars https://github.com/Deci-AI/super-gradients/blob/master/YOLONAS.md, didn't get to implementing road sign detection.

Results

- I have a program that can mostly detect the lane you're in when lighting is good and lines are clear, as well as detect cars a decent amount of time
- As for training results from training the model on the cars dataset:
  - Mean Average Point Precision: 0.975
  - F1: 0.3768
  - Recall: 0.08
  - Precision: 0.2331.