Progress Update: Motion Segmentation

26/01/2022

Introduction

We have continued to resolve our data problems. In regards to the real data, we found that the ratio of dynamic to static vehicles was twice as high in our val set than our test set. We have now balanced this ratio and are currently retraining the network to see if the validation-test performance gap has closed.

For the synthetic data we have made really good progress. Carla maps can now be successfully edited by adding more parked cars. These cars have their own semantic class. The ground truth motion segmentation data is now easily obtained by recording semantic segmentation of the scene and extracting the pixels for the moving vehicles.

KITTI Mod Seg Dataset

Dynamic-Static Vehicles Ratio

- Used *detectron2's* Mask R-CNN, its COCO pre-trained, then trained on Cityscapes

- Network seems to perform well (example image in Figure 1), with some false positives

- Built script to compare pixelwise IoU between pred vehicles and motion segmentation ground truth to get a dynamic to static vehicle count

- Balanced train-val dataset and test dataset to have a similar ratio

- Currently training with these new datasets to see if this closes the validation-test performance gap
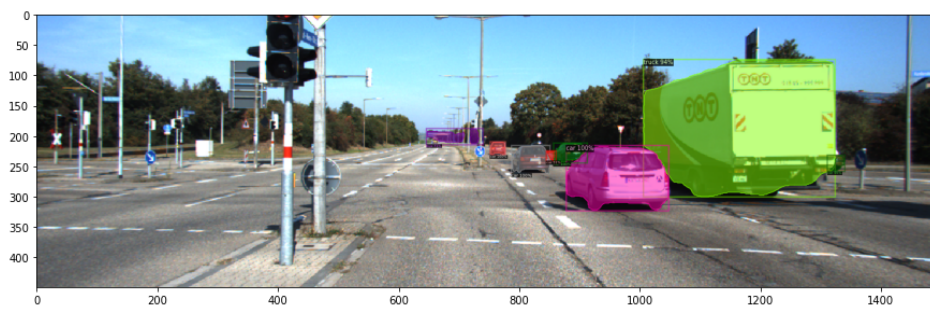

Figure 1: Detectron's Mask R-CNN inference on KITTI

CARLA Data Generation

- Roadrunner approval by TUM Mathworks Admin

- Needed to download and build CARLA from source instead of a pre compiled packaged version; run into various problems from conda to boost etc

- Added stationary vehicles to Town02_Opt with additional semantic label (red in the CityScapesColorPalette used for Semantic Segmentation)

- Level loading for new CARLA layer not yet working

- Changing folder structure to save the same way as KITTI_Seg
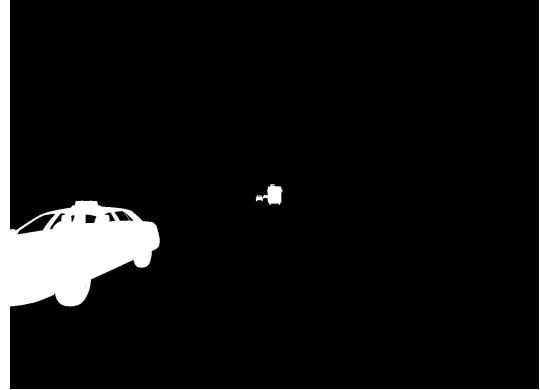
(a) RGB - Image 01   (b) Motionseg - Image 01
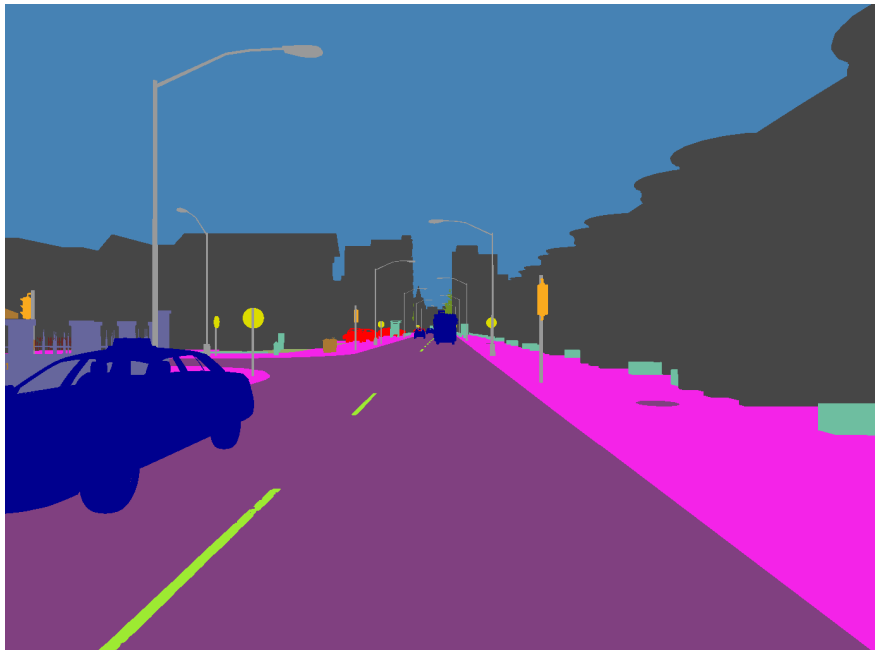
Figure 2: Input data vs ground truth

Figure 3: Semseg - Image 01 Note: In the center left of the image are parked cars segmented as red, different from the spawned (dynamic) cars in blue

Next Steps

CARLA

- Spawn ego vehicle in multiple locations on the map to create multiple sequences

- Check pedestrian spawning for modified maps; currently spawning works for unmodified maps, but not in Town02_Opt

- Use multiple weather conditions for greater generalization