

Summer Internship Project Summary 2019

Project Name: Design and Development of Cognitive Agent for Spatial Navigation

Project Members:

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Project Abstract: Self-driving, or autonomous, cars have been heavily covered in the media. Although sometimes we do see accidents or incidents that show some dangers are present, the trend of late indicates these vehicles will be commonly present in our roads in the years to come.

Conventional self-driving cars require dense 3D map data that inform these vehicles where to go and how to react when obstacles emerge.

Our goal in this project is to predict depth of a frame using a single camera and then segment it into navigable space and obstacle. This segmentation data is then used to help the bot navigate in its surroundings.

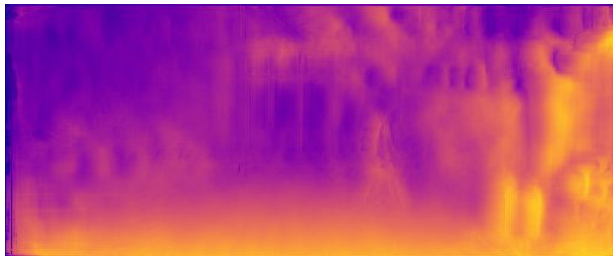


Figure 1: Depth Prediction using GAN's

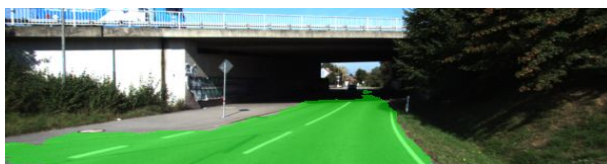


Figure2:ROS-Gazebo Simulation for navigation

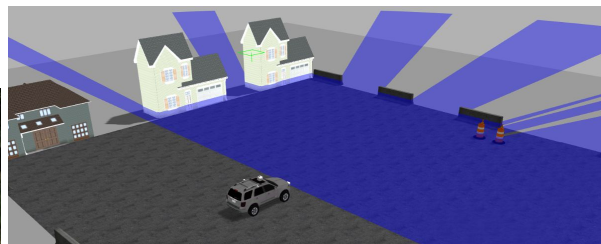


Figure 3: Segmentation using FCN8 Architecture

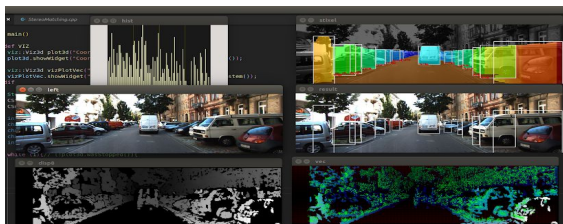


Figure 4: Segmentation using Image Processing (U-V Disparity)

Project Summary:

We used a Vehicle and city simulation to research on segmentation and navigation methods.

A gazebo simulation was setup to collect stereo pair data and test navigation methods

Cityscape dataset was used to generate depth map using GAN's

Different segmentation methods were researched to generate data to train GAN's model

Cityscape and KITTI Datasets were used to create segmented maps using U-V Disparity

CNN-CRF models were trained on the aforementioned datasets to produce segmented images.

The segmented images will then be used as input data along with stereo pair data to train an end to end GAN which will produce segmented images using a single camera.

The segmentation data was used to research on navigation methods.

