Constructing a Map and a Human Driving Dataset from Birds-Eye View Video

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Introduction

Machine learning approaches can generate better autonomous driving models and behaviors, but they need data.

Problem:

- NGSIM dataset is the only suitable public dataset for this purpose. However its size/time period and scope are limited.
- Recent approaches to replicate this dataset need mounting fixed infrastructure, which requires permission, can be expensive, and is not portable.

Solution:

- Using a drone as our only infrastructure.
- Design a portable and easily repeatable flow work.
- Create or own flexible dataset.

Method

1. Extraction of the road

We use Semantic Segmentation, by using CNNs to achieve the mask of the image.

- The model: UNET, with VGG16 pre-trained on imagenet, as its encoder.
- Classes: 0 background, 1 Road

2. Global Coordinate Road Geometry

- Construction of the map, by identifying the lanemarks as reference points, to build the global coordinates.
- This was achieved by using diverse methods of computer vision, such as Canny Edge Detection, Color

3. Transition to local lane geometry

- Translation from pixel space to meters space.

Results

- We were able to represent a map and a dataset, that contains the data of:
  - Local X and Y
  - Vehicle Size
  - Section ID
  - Lane ID

Conclusions

- We developed a process capable of building a map, to obtain diverse values of the location of the driver about the street, in an x-y plane.
- Scalable and easy to repeat.

References


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