Deep Learning for Autonomous Vehicles

Subproject 1 – Module 2

Traffic Light recognition

We've all been there: a light turns green and the car in front of you doesn't budge. No one likes to get stuck behind a vehicle that doesn't notice when a light change. Also, a system that can countdown on red light the time remaining until a change to green can save a significant quantity of fuel in city driving (e.g., restart engine five seconds before green) and advise driver to start braking early if it will not make it through a green light. That's where you get into the picture: in this project, you will develop a model to recognize traffic-light state in the car driving direction.

How do I get started?

1. Download the dataset.
2. Begin building and testing your deep network using TensorFlow or TensorFlow+Keras.
3. Submit your results with csv results file, trained model, code for training and testing the model (shared private GitHub repository)

Dataset used for this project

Bosch Small Traffic Lights Dataset

https://hci.iwr.uni-heidelberg.de/node/6132

https://github.com/bosch-ros-pkg/bstld

This dataset contains 13427 camera images at a resolution of 1280x720 pixels and contains about 24000 annotated traffic lights. The annotations include bounding boxes of traffic lights as well as the current state (active light) of each traffic light.

Dataset description

The camera images are provided as raw 12bit HDR images taken with a red-clear-clear-blue filter and as reconstructed 8-bit RGB color images. The RGB images are provided for debugging and can also be used for training. However, the RGB conversion process has some drawbacks. Some of the converted images may contain artifacts and the color distribution may seem unusual.

Dataset specifications

Training set:

- 5093 images
- Annotated about every 2 seconds
- 10756 annotated traffic lights
- Median traffic lights width: ~8.6 pixels
- 15 different labels
- 170 lights are partially occluded

Test set:

- 8334 consecutive images
- Annotated at about 15 fps
- 13486 annotated traffic lights
- Median traffic light width: 8.5 pixels
- 4 labels (red, yellow, green, off)
- 2088 lights are partially occluded

No Traffic-light in the driving direction


Green traffic-light in the driving direction


Red traffic-light in the driving direction