

# Road Boundary Detection in Image via Machine Learning

## Tentative Project Proposal

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### Objective

Road boundary detection in image is a fundamental topic in SLAM and other applications. While this topic is often directly related to the field of Computer Vision, the current algorithms might not work well when the images are made complicated with the presence of shadows, trees and other elements. We want to find out if it is possible to use Machine Learning to detect road boundaries nicely in these 'noise' images.

### Basic Ideas

We think this project is closely related to other image oriented machine learning projects, like learning how to put color in to a drawing and how to classify the landmarks in the image. The first thing we need to do is find a good representation or model to fit the problem we are dealing with. Finding a good hypothesis space and feature representation is crucial to any machine learning problem, so we will read other papers to figure out this problem first.

Other image involved machine learning projects are usually using neural networks to learn the model, so there is a good chance that we should follow the same approach. We might combine other methods (image processing, computer vision) to get a better result.

As for the dataset, we plan to use the KITTI Road/Lane Detection Evaluation 2013 dataset provided by the Karlsruhe Institute of Technology. This dataset contains road images under complex scenarios with labeled ground truth.



This benchmark has been created in collaboration with [Jannik Fritsch](#) and Tobias Kuehnl from [Honda Research Institute Europe GmbH](#). The road and lane estimation benchmark consists of 289 training and 290 test images. It contains three different categories of road scenes:

- uu - urban unmarked (98/100)
- um - urban marked (95/96)
- umm - urban multiple marked lanes (96/94)
- urban - combination of the three above

Ground truth has been generated by manual annotation of the images and is available for two different road terrain types: road - the road area, i.e., the composition of all lanes, and lane - the ego-lane, i.e., the lane the vehicle is currently driving on (only available for category "um"). Ground truth is provided for training images only.

## Reading List

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- [4] Li, Yuanzhong, Shoji Hara, and Kazuo Shimura. "A machine learning approach for locating boundaries of liver tumors in ct images." Pattern Recognition, 2006. ICPR 2006. 18th International Conference on. Vol. 1. IEEE, 2006.
  
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