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.

Reading List

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[3] By, Conducted. "Automated System for Detecting Jute Plant Disease Using Image Processing and Machine Learning Integrated with Mobile Application." (2016).

[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.

[5] Sofka, Michal, et al. "Integrated detection network (IDN) for pose and boundary estimation in medical images." Biomedical Imaging: From Nano to Macro, 2011 IEEE International Symposium on. IEEE, 2011.