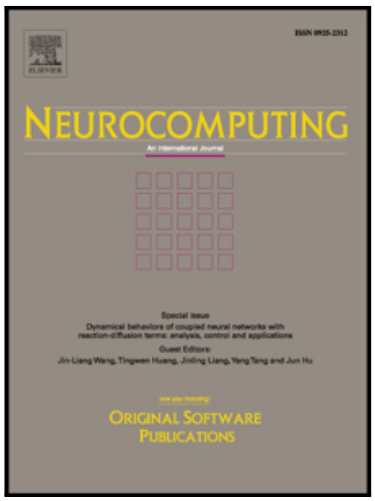

Lane Marking Detection via Deep Convolutional Neural Network

Yan Tian , Judith Gelernter , Xun Wang , Weigang Chen , Junxiang Gao , Yujie Zhang , Xiaolan Li

PII: S0925-2312(17)31763-0
DOI: 10.1016/j.neucom.2017.09.098
Reference: NEUCOM 19069

To appear in: *Neurocomputing*

Received date: 30 January 2017
Revised date: 16 September 2017
Accepted date: 22 September 2017

Please cite this article as: Yan Tian , Judith Gelernter , Xun Wang , Weigang Chen , Junxiang Gao , Yujie Zhang , Xiaolan Li , Lane Marking Detection via Deep Convolutional Neural Network, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.09.098

Lane Marking Detection via Deep Convolutional Neural Network

Yan Tian[1], Judith Gelernter[2], Xun Wang[1]*, Weigang Chen[1], Junxiang Gao[3], Yujie Zhang[1], and Xiaolan Li[1]

[1]School of Computer and Information Engineering, Zhejiang Gongshang University, Hangzhou, P.R.China
[2]Information Technology Laboratory, National Institute of Standards and Technology, Pittsburgh, US
[3]College of Science, Huazhong Agricultural University, Wuhan, P.R.China

Abstract—Research on Faster R-CNN has recently witnessed the progress in both accuracy and execution efficiency in detecting objects such as faces, hands or pedestrians in photograph or video. However, constrained by the size of its convolution feature map output, it is unable to clearly detect small or tiny objects. Therefore, we presented a fast, deep convolutional neural network based on a modified Faster R-CNN. Multiple strategies, such as fast multi-level combination, context cues, and a new anchor generating method were employed for small object detection in this paper. We demonstrated performance of our algorithm both on the KITTI-ROAD dataset and our own traffic scene lane markings dataset. Experiments demonstrated that our algorithm obtained better accuracy than Faster R-CNN in small object detection.

***Index Terms*—Lane Marking Detection, Intelligent Transportation Systems, Deep Learning, Image Processing, Computer Vision**

1. INTRODUCTION

LANE marking detection and localization in traffic scene images is crucial for Intelligent Transportation Systems, which can be used in Automatic Vehicle Driving and Advanced Driver Assistant System (ADAS). Numerous collision accidents are caused by at least one of the vehicles driving out of lane. If lane departure events are early discovered and corrected, some collisions could be avoided. This research improves upon a method to automatically recognize the lane markings on the road with a machine learning algorithm, and a driving out of lane equation is derived as well. The result produced by the equation determines if the driver should be warned about out of lane situation.

Since lane markings are line like features, a wide variety of traditional image processing algorithms could be applied for the task, such as edge detection [1], template matching [2] and Hough Transform [3], in which color, texture, edge and other low-level features are used to detect the area or the edge of the lanes in images.