Machine Learning Approach, Signal Processing, Image Processing for Autonomous Driving System

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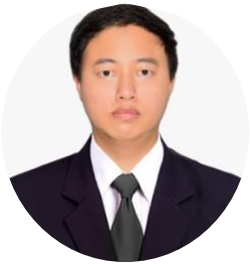
Abstract

Autonomous vehicles are gaining in popularity in modern street and road traffic today. However, the development of autonomous driving systems is still challenging in the research area of image processing and signal processing. There are three main sections of the autonomous driving system in image processing: (i) lane detection, (ii) pedestrian tracking, and (iii) traffic sign recognition. Human eyes can easily detect the road markings on the road, computer systems cannot detect the road markings as human eyes. Therefore, the identification of the traffic markings in the traffic scenes is a key component in autonomous systems. Furthermore, pedestrian tracking is extremely important in autonomous driving systems to make the decision of moving car or path planning. The lane detection and pedestrian tracking systems are implemented in this research work. The traffic sign recognition also plays an important role in autonomous vehicles and there are two main tasks in the traffic recognition system: detection of traffic signs and classification of traffic signs. In this research work, the proposed convolutional neural network (CNN) is based on the LeNet architecture to classify the different traffic signs. The proposed CNN model obtained 97% accuracy on the German traffic sign recognition benchmark.

Keywords: Autonomous driving, convolutional neural network, German traffic sign recognition benchmark, lane detection, and pedestrian tracking



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Education

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Research Interest

- Digital Signal Processing
- Digital Image Processing
- Machine Learning
- Deep Learning