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The research on edge detection algorithm of lane

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Abstract

In developed countries, the automation and intelligent development of vehicles has reached a relatively high level and has gradually developed in China. In recent years, algorithms for lane detection have emerged in an endless stream, but the advantages and disadvantages of comprehensive comparison of various algorithms have resulted in the following problems: First, the robustness of lane line detection is poor, mainly due to the surrounding environment of the road. The impact is greater, in traffic-intensive city streets, affected by natural factors such as trees or building shadows around the driveway; second, the real-time nature of the lane line detection is poor, affected by other marking lines on the driveway, or damaged in the lane. When the pollution is serious, the image of the lane line collected by the system is incomplete and of poor quality, which increases the difficulty of analyzing and processing data of the detection system. This article aims at the problems existing in the current lane line detection and determines the research focus of the article: (1) Improve the accuracy and real-time performance of the detection algorithm. Most of the factors affecting the detection of the lane line are generated before the image is acquired. This requires the strict pre-processing of the collected lane line image to remove a large amount of interference. After the information, not only can the detection result be more accurate but also the complexity of the algorithm be simplified, making the detection result accurate and effective. (2) Use the FPGA for verification. This paper simulates the detection algorithm from two aspects of MATLAB and FPGA, learns the working mode of the related chip and different interface protocols, optimizes the logic design through the hardware design language, and facilitates the hardware implementation of the algorithm. This method can effectively improve the image processing speed, save the logic resources, and better realize the lane recognition function. (3) Improve the existing lane line detection algorithm. There are many algorithms for lane detection, but each algorithm has its own advantages and disadvantages. Part of this article summarizes the advantages and disadvantages of these detection algorithms, analyzes their feasibility in actual detection, and improves the algorithm based on this.

Keywords: Lane line detection and identification, Kirsch algorithm, MATLAB

1 Introduction

The automotive industry is one of the largest and most important industries in the world. According to statistics from China Association of Automobile Manufacturers in 2016, the total number of automobile production and sales in China was 28.119 million vehicles and 28.058 million vehicles, a record high [1].

With the constant popularity of automobiles and the continuous improvement of people's living standards, almost every family owns one or more cars, providing people with a comfortable and convenient travel life. Although entering the twenty-first century, the post-modern transportation system has been very developed, but it is still not in direct proportion to the increasing traffic environment demand of people. The rapid development of the automotive industry has also brought with it environmental pollution, energy shortages, traffic jams, and traffic safety issues, among which traffic safety issues are particularly acute and thorny and have developed into a major global problem [2].

In China, the number of casualties caused by road traffic safety exceeds 200,000 each year, and the total number of traffic accidents handled is approximately 4.7 million people [3]. Research shows that the number of casualties and property losses caused by traffic accidents will continue to increase substantially in the coming years, and the losses caused by road traffic will become one of the three major factors leading to global disease

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