WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Lane and Obstruction Detection for Self Driving Car

Shreyas Pansare[1], Pranav Salunkhe[2], Yash Kankariya[3], Sahil Bhosale[4], Dr. S. K. Shinde[5]

[1]Student (B.E. Computer) VPKBIET Baramati
[2]Student (B.E. Computer) VPKBIET Baramati
[3]Student (B.E. Computer) VPKBIET Baramati
[4]Student (B.E. Computer) VPKBIET Baramati
[5]Prof (Computer Engineering) VPKBIET Baramati

ABSTRACT—

In today's world, vehicle accidents are one of the most significant issues. One of ideas that will change our future by delivering increased safety and mobility is the autonomous traffic system. Proposed method is critical in the development of autonomous traffic systems. The suggested system presents a new machine vision-based lane line recognition method for detecting yellow and white lane markings as well as curve lanes in complex settings. We use a camera installed on the car to obtain the front image in order to recognize a lane. To enable realtime lane recognition, a created pre-processing phase was established, which included grayscale conversion, noise reduction, edge recognition with Canny operators, line extract using polynomial fitting approach, and straight lane line extraction using half line transform. This suggested system employs a vision-based technique capable of recognizing and tracking structured road borders (paint or unpainted lane lines) with slight curve and shadow circumstances in real time. After performing the edge information and Hough transform, the road boundaries are determined by matching a parallel hyperbola set to the lane edges. The experiment demonstrates that the system can recognize the curve and lane line accurately under a variety of operating conditions.

I. INTRODUCTION

To be a careful driver he must Be able to detect surroundings Be able to make actions based on situation.Humans have finite attention span and non expandable programming capacity How much convinient will it be if "Things we drive have capacity to drive themselves". Lane and Object detection detection Can also help in avoiding road accidents .While following this road if an object is detected our Prototype will change its course if another lane is available

The main objective of this paper is built lane detection system for self-driving car using opencv. For building this system we study lane detection techniques, Image Processing, types of lanes, weather condition that affect system. As well as creating software intelligence we must also synchronise hardware capability with it to ensure timely action in case of collision , So our secondary objective was to build a robot which can sense and accutate the environment Our tertiary objective will be to reduce time complexity of Whatever reference algorithms we used

II. LITERARTURE SURVEY

A. Real Time Lane Detection for Autonomous Vehicles [1]

In intelligent transportation systems, intelligent vehicle co- operate with smart infrastructure to achieve a safer environ- ment and batter traffic conditions.Although, a more convincing reason to build intelligent vehicles is to improve the safety conditions by the entire or partial automation of driving tasks. Among these tasks, the road detection took an important role in driving assistance systems that provides information such as lane structure and vehicle position relative to the lane. However, the most compelling reason for adding autonomous capability to vehicles that to ensure the safety requirement

Healthcare is well known field where Machine Learn- ing made big phases of enhancements because of the huge amount of data being processed and analyzed. It changed the diagnosing process for better accuracy based on the new technologies emerged in the past decade that became tools in every hospital. The purpose of this thesis is to research and implement multiple machine learning techniques, to predict Autism Spectrum Disorder over large scale datasets.

Vehicle crashes remain the leading cause of accident death and injuries in Malaysia and Asian countries claiming tens of thousands of lives and injuring millions of people each year. Most of these transportation deaths and injuries occur on the nation's highways. The United Nations has ranked Malaysia 30th among countries with the highest number of fatal road accidents, registering an average of 4.5 deaths per 10,000 registered vehicles.

Safety is the main objective of all the road lane detection systems due to the reason is that most of the vehicle road acci- dent happens because of the driver miss leading of the vehicle path. Therefore, currently many different vision-based road detection algorithms have been developed to avoid vehicle crash on the road. Among these algorithms the GOLD system developed by Broggi, it uses an edge-based lane boundary detection algorithm [3]. The acquired image is remapped in a new image representing a bird's eye view of the road where the lane markings are nearly vertical bright lines on a darker background.

B. Vision Based Lane Detection for Self-Driving Car [2]

Lane detection is a key reference for traffic safety .In the in- telligent transportation system, lane line is the most important traffic sign in road traffic, which can restrain and guarantee the running of vehicles, so as to maintain the safety highly secured [1-2]. Machine vision is considered to be effective and simple during the process of lane detection. Lane line detection and identification has become a basic and necessary functional module in the field of vehicle safety and intelligent vehicle navigation, which can not only reduce the occurrence of traffic accidents, but also provide help for indepth research on intelligent traffic. The lane detection technology based on machine vision also has the advantages of low cost and strong versatility and has been widely used. Many papers have researched and provided various lane tracking strategies for intelligent vehicles, but they can't solve the problems of yellow lane line recognition and curve lane line detection under complex circumstances. The main features of lane marker pixels extracted from the image are edge feature [3], and color feature [4]. Many methods have been applied to lane detection, including Hough transform [5] method, dynamic programming [6] method, calculation model that interprets road structure by deforming contour line [5], and segmental constant curvature [7] method. Recently, there have been many articles focusing on the realtime detection of lane lines [8] – [10]. The experiments contain challenging urban scenes and provide functions such as lane departure warning.

This paper proposes a accurate lane detection system, which has the following characteristics compared with previous lane detection methods: 1) Common yellow and white lane lines are processed separately in HSV space and then combined. The detection accuracy of yellow lane lines can be significantly improved compared with the traditional method of extracting lane lines directly after the graying of pictures. 2) By using sliding window polynomial fitting method, which overcomes the shortcoming of the traditional Hough transform which is only applicable to single straight lane lines, and can improve the detection accuracy of curved lane lines in a complex environment. 3) After fitting the curve equation of the lane line, the vehicle deviation distance is detected according to the middle point of the two lane lines, and this can be used as the decision parameter for the early warning of vehicle deviation.

C. Vision-Based Lane Detection for Autonomous Artificial Intelligent Vehicles through feature selection-based machine learning [3]

The Autism Spectrum Disorders (ASD) is now on the rise affecting 1 in 68 individuals in the United States. Despite an important advance in understanding the genetics of ASD, ASD remains diagnosed by behavioral testing. ASD currently performed using tools designed to measure impairment in the two main domains of ASD as defined according to the Diagnostic and Statistical Manual of Mental Disorders, com- munication and social interaction and restricted interests and repetitive behaviors. Autism diagnostic Observation Schedule (ADOS) is one of the most widely used uses tools to help

diagnose ASD. ADOS consists of a series of semi-structured activities designed to elicit specific social interaction behavior, communication, imaginative use objects, limited interests, and repetitive behaviors.

In intelligent transportation systems, intelligent vehicle co- operates with smart infrastructure to achieve a safer environ- ment and batter traffic conditions. Although, a more convinc- ing reason to build intelligent vehicles is to improve the safety conditions by the entire or partial automation of driving tasks. Among these tasks, the road detection plays an important role in driving assistance systems that provides information such as lane structure and vehicle position relative to the lanes.

However, the most compelling reason for adding au- tonomous capability to vehicles is to ensure the safety require- ment. Vehicle crashes remain the leading cause of accident death and injuries in Malaysia and Asian countries claiming tens of thousands of lives and injuring millions of people each year. The United Nations has ranked Malaysia 30th among countries with the highest number of fatal road accidents, registering an average of 4.5 deaths per 10,000 registered vehicles

Safety is the main objective of all the road lane detection systems due to the reason is that most of the vehicle road acci- dent happens because of the driver miss leading of the vehicle path. Therefore, currently many different vision-based road detection algorithms have been developed to avoid vehicle crash on the road. Among these algorithms the GOLD system developed by Broggi, it uses an edge-based lane boundary detection algorithm [3]. The acquired image is remapped in a new image representing a bird's eye view of the road where the lane markings are nearly vertical bright lines on a darker background. Specific adaptive filtering is used to extract quasi vertical bright lines that concatenated into specific larger segments. Kreucher C. proposed in [4] the LOIS algorithm as a deformable template approach. A parametric family of shapes describes the set of all possible ways that the lane edges could appear in the image. A function is defined whose value is proportional to how well a particular set of lane shape parameters matches the pixel data in a specified image. Lane detection is performed by finding the lane shape that maximizes the function for the current image. The Carnegie Mellon University proposes the RALPH system, used to control the lateral position of an autonomous vehicle [5]. It uses a matching technique that adaptively adjusts and aligns a template to the averaged scan line intensity profile in order to determine the lane's curvature and lateral offsets. The same university developed another system called AURORA which tracks the lane markers present on structured road using a color camera mounted on the side of a car pointed downwards toward the road

Edge Detection Lane boundaries are defined by sharp con- trast between the road surface and painted lines or some type of nonpavement surface. These sharp contrasts are edges in the image. Therefore edge detectors are very important in determining the location of lane boundaries. It also reduces the amount of learning data required by simplifying the image

considerably, if the outline of a road can be extracted from the image. The edge detector implemented for this algorithm and the one that produced the best edge images from all the edge detectors evaluated was the 'canny' edge detectorIt was important to have the edge detection algorithm be able to select its own thresholds automatically. The canny edge detector also has a very desirable characteristic in that it does not produce noise like the other approaches do and simplify the lane detection, a bottom up scanline search on the edge image. For each scanline, from image center to image boundary, search stops at edge pixels. Since the road is a normally long and smooth curve. There is one problem with the edge detection which difficult to pick one edge detection operator for every situation, one solution to this could be to darken the images intensity. However, this idea needs to be integrated. As a result, the road edges become clear which will make the lane detection more efficient

D. A Method of Real Time and Fast Lane Line Detection [4]

With the development of China's automobile industry, the convenience of car for people's life has become more and more obvious, followed by the car driving safety problems. In recent years, the frequent occurrence of various major traffic accidents has brought great losses to people's lives, and it has also posed a great threat from both economic and security aspects. Therefore, how to prevent the occurrence of such accidents, improve the safety of the car driving has become a hot topic. According to the relevant data, more than one-third of the accidents were due to car driver's fatigue driving or negligence and deviated from the lane line caused. Therefore, to avoid lane departure has become an important thing [1- 5]. The lane line detection technology is important to avoid lane departure when the vehicle is running. In the actual lane traffic, the structure of the lane line is very complicated. For example, the left and right lane lines are solid line, both sides are dotted line, and one side is solid and the other side is dotted line. In this paper, we first preprocess the captured image, and then propose a method of segmented region of interest and completing the lane line fitting. The method can detect the structured lane line, and it is important for the safe driving system with deviation from Lane warning

The road images are complex and are susceptible to some conditions and random noise. It is more difficult to identify the lane line from the image directly. We used a series of image.preprocessing operation of image grayscale, spatial do- main median filtering and image binarization. The operations can effectively reduce the salt and pepper noise [6-7] and some pulse signal interference to the image, reduce the amount of data processing and algorithm complexity, and better identify the lane line

Image Grayscale In real life, color images contain a lot of irrelevant information which results the processing is particu- larly timeconsuming. Taking into account the color quantifi- cation method, we turn the color map into a gray scale. This method improves the efficiency of time processing without changing the original details. There are many kinds of color models. We use the more commonly used RGB composition method. Each type of color is seen as a combination of red, green and blue according to the corresponding proportion. Grayscale image is special. The range of each channel varies from 0 to 255. As a result of a single channel, memory took up is very small. We use the weighted average method to convert the color image to grayscale image.

In the lane departure warning system and the car intelligent driving system, in order to obtain the ideal lane mark line edge image, to better realize the identification of lane mark line, lane line real-time detection was an important technology. Based on a series of processing, such as gray scale, noise filtering, edge detection and image binarization, this paper proposed a threesegment ROI model based on the close region, the sub- close region and the prospective region..

E. Figures

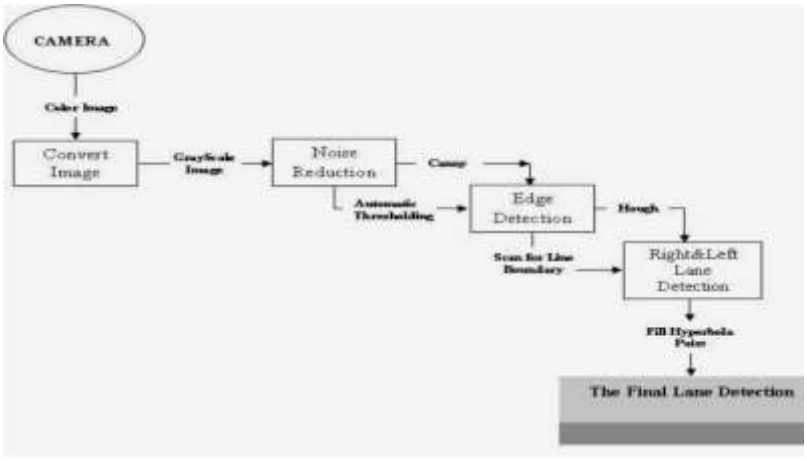

Fig. 1. Overview of Algorithm

III. CONCLUSION

In this methodology, alternative lane detection technique is used that provides safety of human being on road and usefull with current challenges. The proposed system uses opencv library and its functions such as the Canny Function through which edge detection achived , concept of Image Processing and line fitting. Lane are identified by Hough Transform. There are various techniques that work successfully in uncontroled atmosphere

REFERENCES

[1] Abdulhakam.AM.Assidiq, Othman O. Khalifa, Md. Rafiqul Islam, Sheroz Khan, Real Time Lane Detection for Autonomous Vehicles,2008

[2] Ziqiang Sun, Vision Based Lane Detection for Self-Driving Car,2020

[3] Othman O. Khalifa, Abdulhakam.AM.Assidiq, Vision-Based Lane De- tection for Autonomous Artificial Intelligent Vehicles,2009

[4] Honghua Xu, Li Li*, Ming Fang, A Method of Real Time and Fast Lane Line Detection,2018