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CAR LANE DETECTION USING NUMPY WITH OPENCV PYTHON

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Abstract

Driver support system is one of the most important features of the modern vehicles to ensure driver safety and decrease vehicle accident on roads. Apparently, the road lane detection or road boundaries detection is the complex and most challenging tasks. It is including the localization of the road and the determination of the relative position between vehicle and road. A vision system using onboard camera looking outwards from the windshield is presented in this paper. The system acquires the front view using a camera mounted on the vehicle and detects the lanes by applying few processes. The lanes are extracted using Hough transform through a pair of hyperbolas which are fitted to the edges of the lanes. The proposed lane detection system can be applied on both painted and unpainted roads as well as curved and straight road in different weather conditions. The proposed system does not require any extra information such as lane width, time to lane crossing and offset between the center of the lanes. In addition, camera calibration and coordinate transformation are also not required. The system was investigated under various situations of changing illumination, and shadows effects in various road types without speed limits. The system has demonstrated a robust performance for detecting the road lanes under different conditions.

Keywords—Image processing, Hough Transform, Python, Deep learning.

Introduction

The emergence of vehicles has liberated human feet from long journeys. In a modern society where almost every household has a car, people enjoy the convenience of travel, but also face many traffic hazards. To help make the driving safer and more intelligent, intelligent driving uses various sensing and detection equipment along with advanced algorithms to acquire, process and analyse the collected data promptly, so that driver can be alert to potential dangers and vehicles can be controlled automatically.

Various learning based methods are widely used for their flexibility of handling complex scenes in modern intelligent transport systems and recent deep learning techniques further add wings to the development of intelligent driving. They gain immense success in reinforcement learning, unsupervised learning, supervised learning and their hybrids. Various types of deep learning algorithms play their advantages in all aspects of intelligent driving. Generally speaking, deep reinforcement learning is the product of combining deep learning and reinforcement learning. Deep unsupervised learning refers to solving various problems based on unlabelled training samples. It includes generative deep structures, such as auto encoder, deep belief networks (including Boltzmann machines) and Generative Adversarial Networks (GAN). Deep supervised learning with labelled samples has achieved great success on Euclidean data and sequential data with Convolution Neural Network (CNN) and Recurrent Neural Network (RNN) respectively, and supervised learning directly on various non-Euclidean data structure with Bayesian deep learning also arouses much attention.

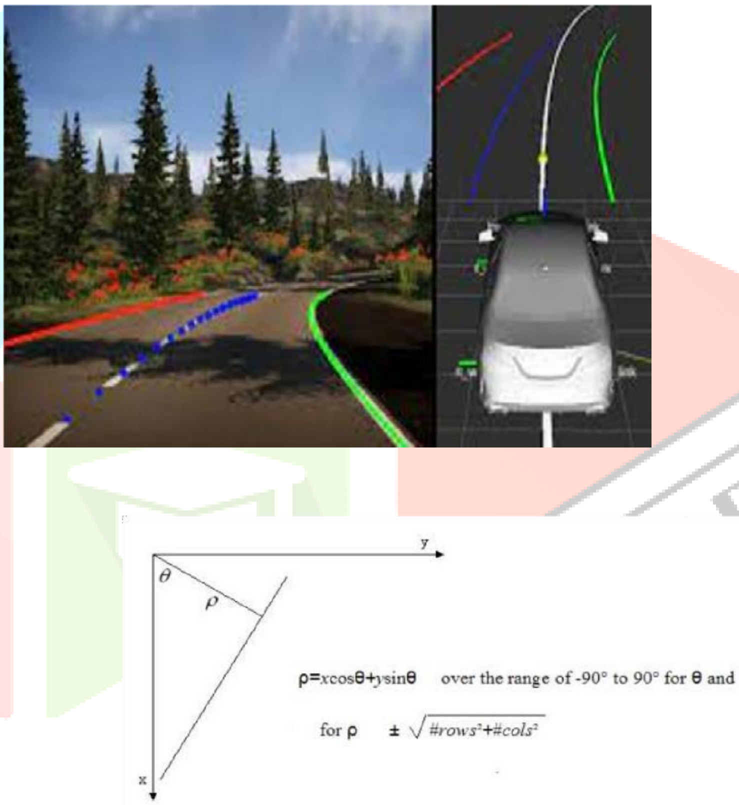

Fig. 1

Objective

In addition to the intended application of the vision lane detection system, it is important to evaluate the type of conditions that are expected to be encountered. Road markings can vary greatly between regions and over nearby stretches of road. Roads can be marked by well-defined solid lines, segmented lines, circular reflectors, physical barriers, or even nothing at all. The road surface can be comprised of light or dark pavements or combinations.

An example of the variety of road conditions is presented. Some roads are relatively simple scene with both solid lines and dashed lines lane markings. Lane position in this scene can be considered relatively easy because of the clearly defined markings and uniform road texture. But in other complex scene in which the road surface varies and markings consist of circular reflectors as well as solid lines, the lane detection would not be an easy task. Furthermore, shadowing obscuringroad markings makes the edge detection phase more complex.

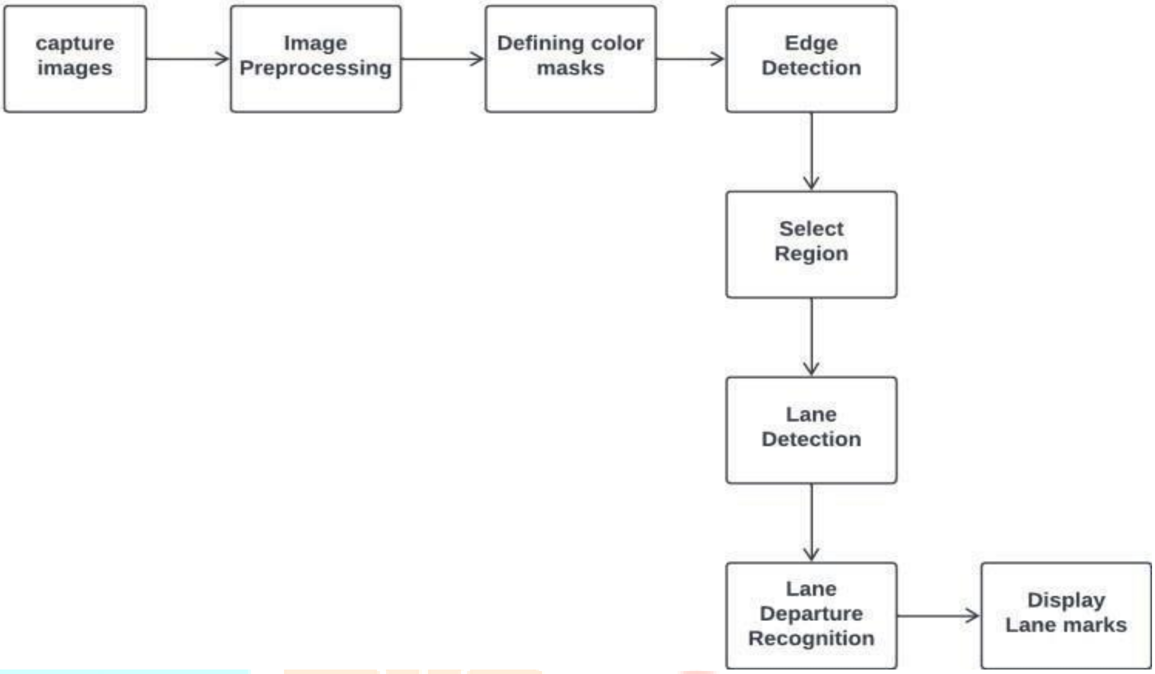

Fig. 2: Block Diagram

MODULE DESCRIPTION

Opencv Using Display the Lane

The camera to access the user to live streaming video from his system and application will connect to that video and start access it. The Application detect the lane it will mark that object with bounding boxes, while user wants to stop tracking then he press the esc key from keyboard to stop streaming live video.

Preprocessing:

An important part of lane detection is image processing in order to achieve an accurate result. The first step in image processing is to convert the gray scale i.e., converting the images into gray ones. The first step in image processing is grayscale processing, which converts color images into grayones.Gray scale processing is used to carry out the next step, binarization in which the gray image is turned into a black-and-white image. Many algorithms were proposed on how to implement binarization. A new algorithm was proposed to improve the traditional algorithm by using an adaptive threshold instead, which improves binarization performance for old images.

Define Color Masks:

Defining color masks allows color based pixels selection in an image. The intention is to select only white and yellow pixels and set the rest of the image to black. To prepare for edge detection it is useful to smoothen the image so artificial edges are not detected due to noise

Edge Detection And Select Region:

The main reason for this is the further need to compute line equations from independent pixels. Edges are detected using the Edge Filter applied to a grayscale image. The algorithm will first detect strong edge(strong gradient) pixels above the high. Mask is initially a zeroes matrix of the same size as the grayscale image. The mask is applied using bitwise and to the grayscale image

Lane Detection:

The approach determines the lane lines for the straight line by using the starting point and finishing point. For the straight line, the method uses the beginning point and the end in order to determine the lane lines. In the case of a curve, the approach calculates the bending direction of the curve on the right base and determines the waveform using the least square fit. Wei et al. used points of disappearance and some pixels around points, the classic Hough transfer was improved. The Hough Transform is a technique for locating lines by identifying all of their points. This can be performed by representing a line as points. These points are represented as lines/sinusoidal(depending on Cartesian/Polar coordinate system). If multiple lines/sinusoidal pass through the point, We can deduce that these points lie on the same time.

Lane Departure Recognition:

While the gap between the car and the left lane line is much less than the distance between the vehicle and the right lane line, the car starts to flow to left, otherwise, the automobile starts of evolved to flow proper. The deviation distance of the vehicle, in truth can be calculated by wayof the ratio of the deviation distance and driveway inside the picture. Whilst the deviation distance exceeds a selected cost, LDWS works and warns the driving force to adjust again to the safe using range inside the driveway.

Methodology

In some proposed systems such the lane detection consists of the localization of specific primitives such as the road markings of the surface of painted roads. Some systems achieves good results, but detecting the road lane remains a challenging task under adverse conditions likeheavy rain, degraded lane markings, adverse meteorological and lighting two situations can disturb the process. The presence of other vehicles on the same lane may occlude partially the road markings ahead of the vehicle are the presence of shadows caused by trees, buildings etc. Here we are using microcontroller which will acts as main memory of the project. PYTHON image processing technique is used to detect the lanes. If the vehicle not moving on particular lane, the information are shows in LCD display. Ultrasonic sensors are sense the distance between vehicle and in front of vehicle. If it is nearest distance then the car engine slow down which avoid dangerous accidents. All the details are updated in IOT webpage. Whenever accident occurred, the MEMS sensor values are changes to abnormal. The controller gets the input from MEMS sensor and sends the accident alert information to rescue team or family member and location of the accident place through IOT. The vehicle is supposed to move on a flat and straight road or with slow curvature.

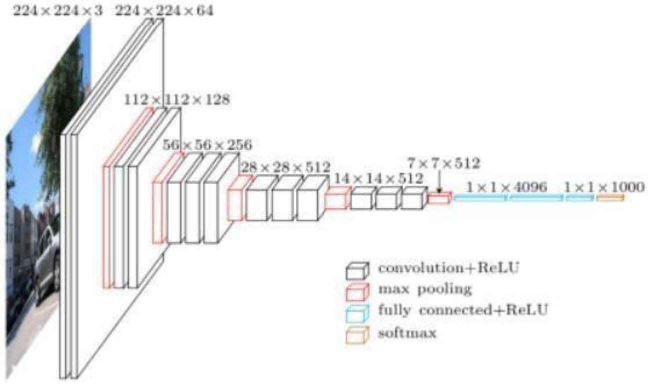

Fig. 3

Proposed System Algorithm:

CNN Algorithm:

Step 1: Choose a Dataset

Step 2: Prepare Dataset for TrainingStep 3:

Create Training Data

Step 4: Shuffle the Dataset

Step 6: Normalising X and converting labels to categorical dataStep 7: Split

X and Y for use in CNN

Step 8: Define, compile and train the CNN ModelStep 9:

Accuracy and Score of model

Input activity diagram

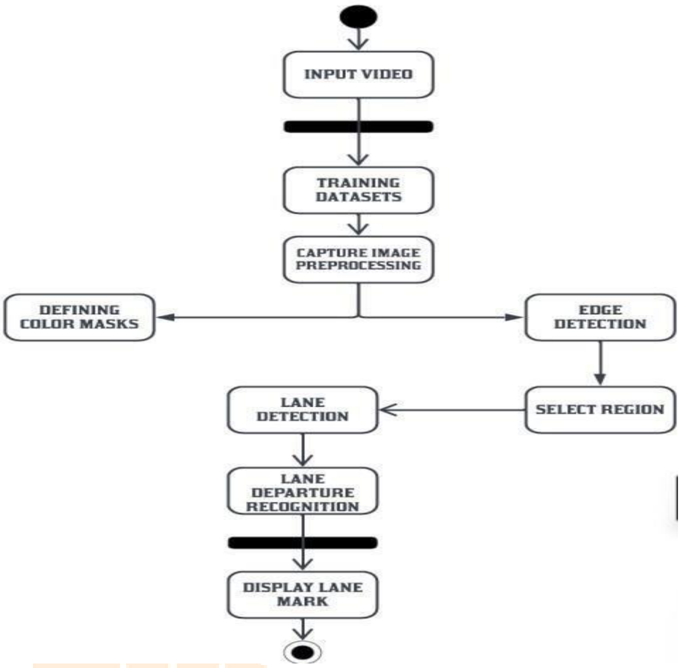

Fig.4 Activity Diagram

Result

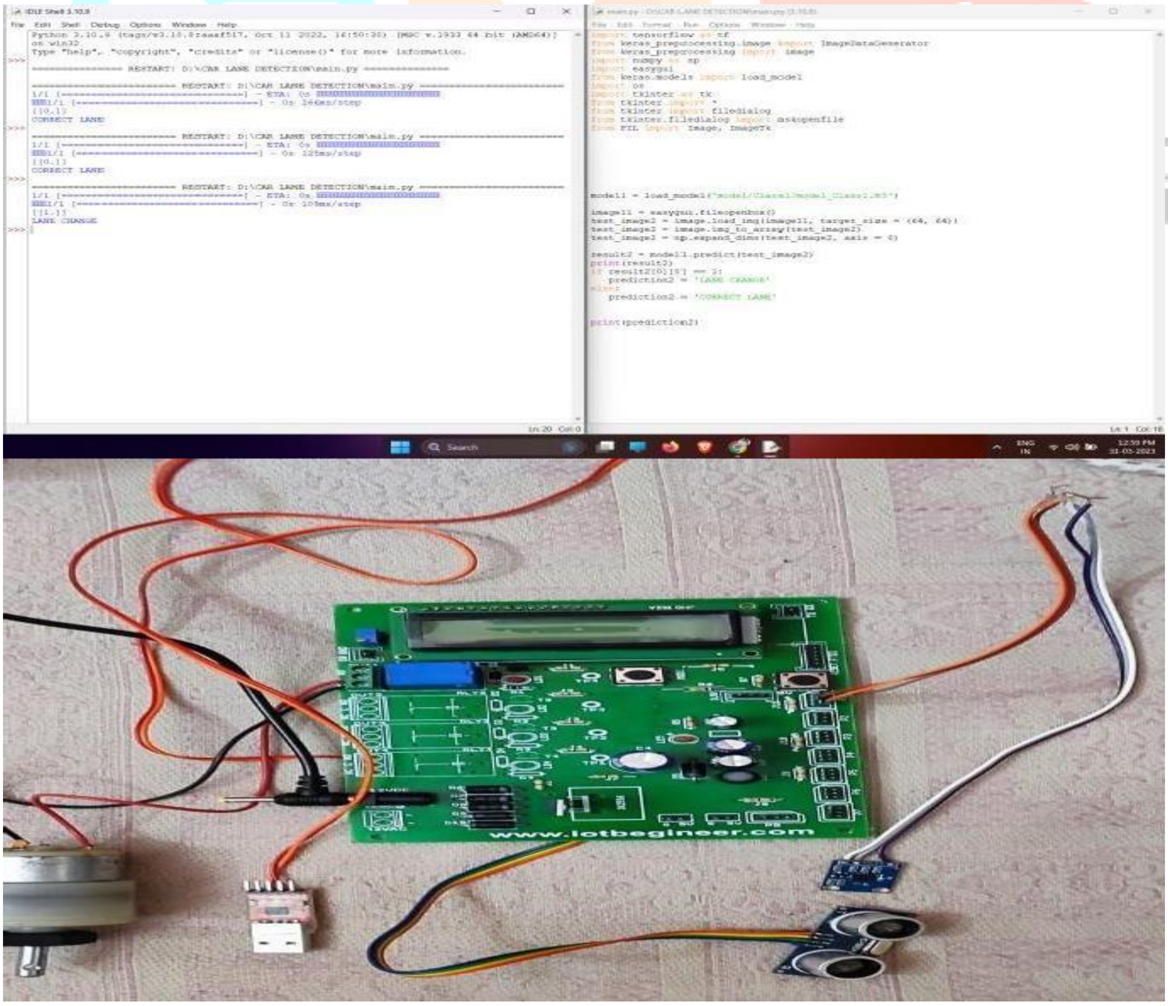

Fig. 5

Conclusion

In this paper, a real time vision-based lane detection method was proposed. Image segmentation and remove the shadow of the road were processed. Canny operator was used to detect edges that represent road lanes or road boundaries. A hyperbola-pair road model used to deal with the occlusion and imperfect road condition. A series of experiment showed that the lanes were detected using Hough transformation with restricted search area and the projection of their intersection will form the last scan point called the horizon. Furthermore, In order to search out for the left and right vector points that represent the road lanes, the lane scan boundary phase uses the edge image and the left and right Hough lines and the horizon line as inputs, to effectively allocate the lane points. That was demonstrated by two hyperbola lines. The experimental results showed that the system is able to achieve a standard requirement to provide valuable information to the driver to ensure safety.

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