INTERNATIONAL RESEARCH JOURNAL IN ADVANCED ENGINEERING AND TECHNOLOGY (IRJAET) E - ISSN: 2454-4752 P - ISSN : 2454-4744
VOL 4 ISSUE 6 (2018) PAGES 4073 - 4078
RECEIVED : 20.10.2018 PUBLISHED : 16.11.2018
Nov 16, 2018

LANE LOCALIZATION OF VEHICLE FOR SELF DRIVING USING STEREO VISION SYSTEM

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Abstract:

Lane localization of vehicle is an important and a fundamental technology in vehicle driving. To get the effective and the accurate performance the LIDAR, ADAS technologies are used. However their estimation cost is high and the implementation of these technologies will not provide the necessary solutions. This paper explains the stereovision system, which has high accuracy and also low cost. It implements the lane line detection algorithm which will detect the mentioned line and the direction. The 3D reconstruction scheme which has three main steps: preprocessing, lane line detection and classifier. The left and right pixel detection and the color conversion are done in preprocessing. Model fitting is used to detect the lane white and yellow lines crossing and breaking. Particle filter detects the road shape and direction of the stereovision images. The proposed system will be more effective in different weather condition and environment.

Keywords: Stereo vision, particle filter, lane localization, lane line detection, Model fitting.

I. Introduction.

For reasons of safety and efficiency, there is a great deal of interest in localizing road vehicles. The earliest positioning methods pre-date written history and were used by early land travelers and sailors. On-vehicle lane detection plays a significant role in Advanced Driver Assistance Systems (ADAS) and autonomous vehicles. This subject has been deeply studied for more than twenty years, where studies such as can be considered as representative works. The main objective here is to determine the position of the lane markings, which represents key information of the environment structure for road geometry estimation and context recognition (e.g. highway, urban) [1]. The implementation of lane localization of vehicle is relatively easy using the various sensors like dead reckoning (DR) and mono-frequency GNSS (Global navigation satellite system) receivers with patch antennas and a front looking lane detection camera [2]. The main aim of the lane localization is to detect the damages in the road surface, the 3D reconstruction algorithm is implemented in stereo vision system to detect it [3]. In this the particle filter is used to detect the direction of the vehicle moving while driving without use of GPS [4]. The model fitting is used monitor the car along with the direction of left and right [5]. Vision based road lane line detection provides a feasible and low cost solution as the vehicle pose can be derived from the detection. While good progress has been made, the road lane line detection has remained an open one, given challenging road appearances with shadows, varying lighting conditions, worn-out lane lines etc. In this paper, we propose a more robust vision-based approach with respect to these challenges [6].

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II. Block diagram

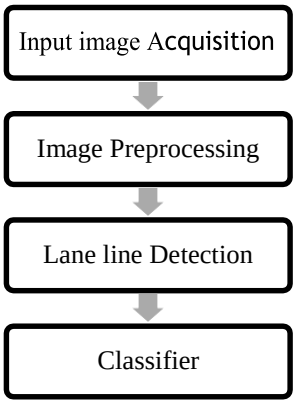

Fig1.Block diagram of proposed system

The proposed algorithm is capable of detecting bright long structures in the images. However lane line markings, direction boundary, line crossing and line braking are detected by the implementation. The proposed system has the following steps to be followed they are,

III. System Overview

IMAGE ACQUISITION

We have used specialized stereo video to acquire the input images from the real time world we design a customized mechanism to determine camera exposure time to prevent over/under exposure.

IMAGE PREPROCESSING

The preprocessing is done in the video file which will perform the color conversion from RGB to YCbCr and RGB to intensity, Hough transform, image filter and the edge detections are done to detect the vision clearly and accurately.

LANE LINE DETECTION

The lane line detection is used to detect the white and yellow line crossing and the breaking of line while moving the direction. The Hough transform is used to detect the line in the video.

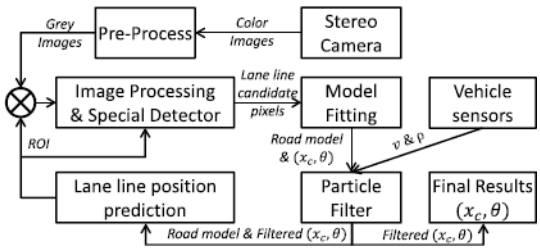

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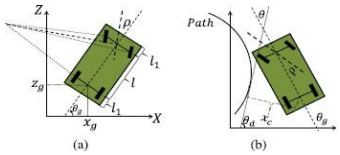
Fig2: Lane line algorithm flow diagram

Fig3: from hump image detecting the lane line accurately (a) Hump image (b) lane line detection

The particle filter is used to detect directions while driving vehicle in the road. Both the right and left directions are identified and mentioned.



The model fitting is used to detect the straight line in the road

The model is derived based on the following coordinate systems, including global (or road), car and camera (left or right).

CLASSIFIER

After getting the detected output we have four kinds of classification are done here depending upon the type of the road lane.

IV. Results Snaps

The image gives the output of the road while driving the vehicle that indicates the White line in the image.

Both the white line crossing and breakings are mentioned in the images.

Fig3: output snap for White lane localization

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This image gives the result of the white line breaking along with the right direction departure is mentioned.

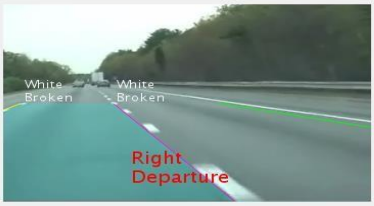

Fig4: output snap for White lane breaking localization with right departure

This image gives the result of the white line breaking and yellow line crossing.

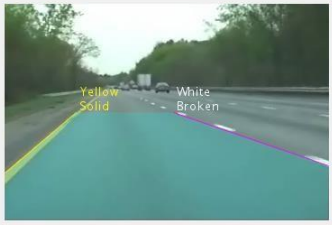

Fig5: output snap for Yellow lane localization

This image gives the result of the white line breaking and yellow line crossing along with the left departure direction indication.

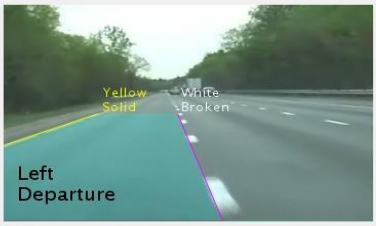

Fig6: output snap for Yellow lane localization and left departure

V. Conclusion

In this paper the lane localization for vehicle using stereovision system is implemented. The lane line detection is used to detect the white and yellow line crossing. The breaking of the lines is also mentioned along with the left and right direction. The proposing method will be more accurate and robust during the dark night. In future we can implement this in real time with hardware combination model. It has high accuracy level of 98.6% and goof performance in different climatic condition while driving vehicle in standard road.

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