



LANE LINE DETECTION WITH COMPUTER VISION USING ARTIFICIAL INTELLIGENCE

Julia Faith.S¹,Liyakath Ali B².Manzoor.N³,Nandhakumar.N⁴

¹.Assistant professor. ^{2,3,4}UG Scholar

Department of Information Technology

S.A.ENGINEERING COLLEGE

Abstract

Lane detection plays an important role in intelligent vehicle systems. Therefore, this paper presents a robust road lane marker detection algorithm to detect the left and right lane markers. The algorithm consists of optimization of Canny edge detection and Hough Transform. The system captures images from a front viewing vision sensor placed facing the road behind the windscreen as input. Then a series of image processing is applied to generate the road model. Canny edge detection performs features recognition then followed by Hough Transform lane generation. The algorithm detects visible left and right lane markers on the road based on real-time video processing.

Introduction

Now a day the road accidents have increased to a great extent. Most of the accidents occur due to driver's negligence and carelessness while driving. Advance driver assistance system (ADAS) plays an important role in providing safety to drivers. It helps to automate the car system and increases the driving experiences. The Advance driver assistance system (ADAS) provides a safe system to reduce the road accidents. The system takes an vigorous step like warning the driver or takes a corrective action to avoid an accident during the risky situation. The Lane Departure Warning (LDW) is an important unit in Advance driver assistance system.

In vision based lane departure system, a camera is placed behind the wind shield of the vehicles and images of the road is captured. The white stripes on the road are interpreted and lanes are identified. Whenever the vehicle goes out of the lane then the warning is given to the driver. In lane departure warning system, the lane detection is the primary step to be taken. There are two types of approaches used in lane detection: the feature based approach and the model based approach. The features based approach detects the lane in the road images by detecting the low level features such as lane edges or highlighted lanes etc. This approach requires well highlighted lines or strong lane edges, otherwise it will fail. This approach may suffer from occlusion or noise. The geometric parameters such as assuming the shape of lane can be presented by straight line or curves are used by the model based approached.

System architecture

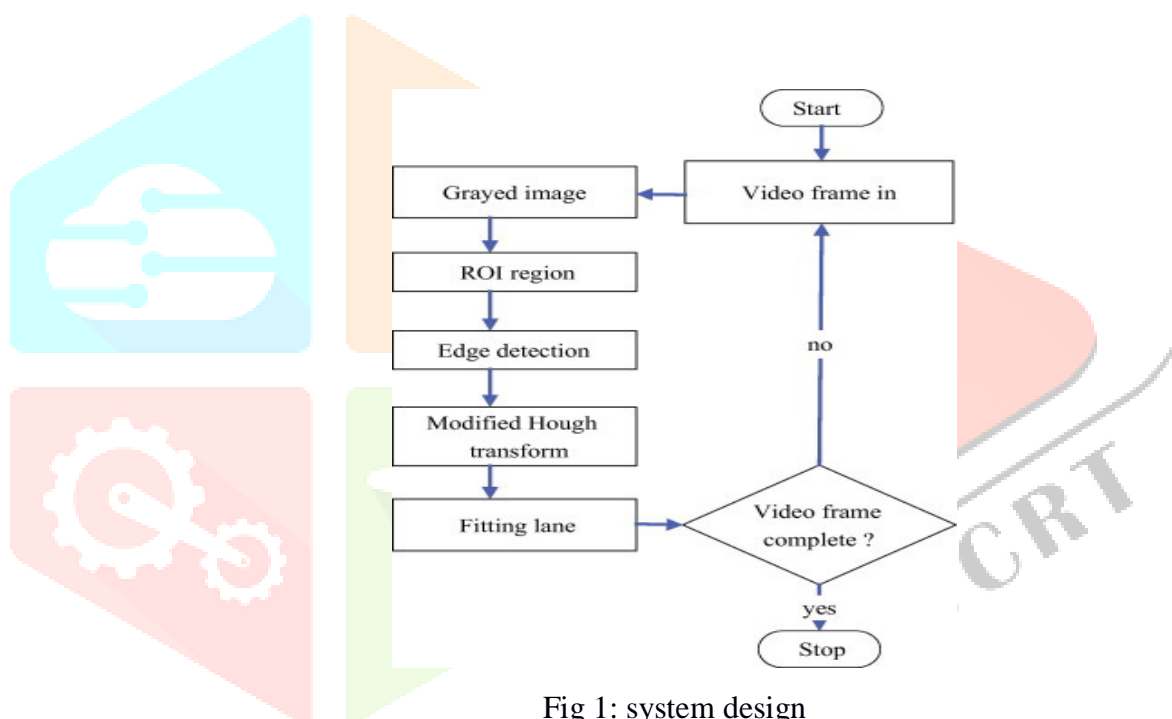


Fig 1: system design

Pre-Processing of image

The input image is converted into grayscale image which is needed for Canny Edge Detection

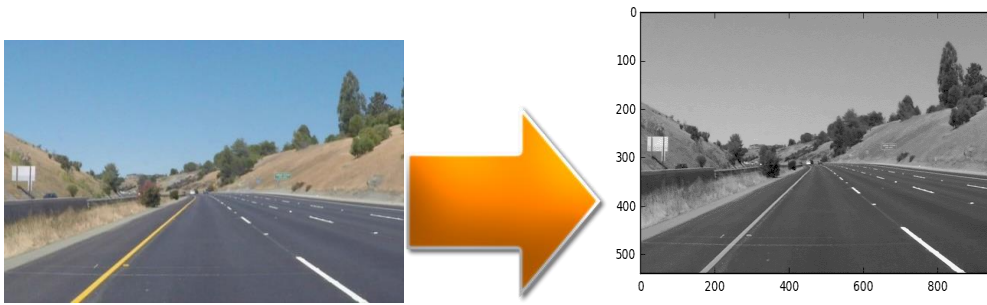


Fig 2: pre processing

Canny Edge Detection

Canny edge detection is an operator that uses the horizontal and vertical gradients of the pixel values of an image to detect edges.

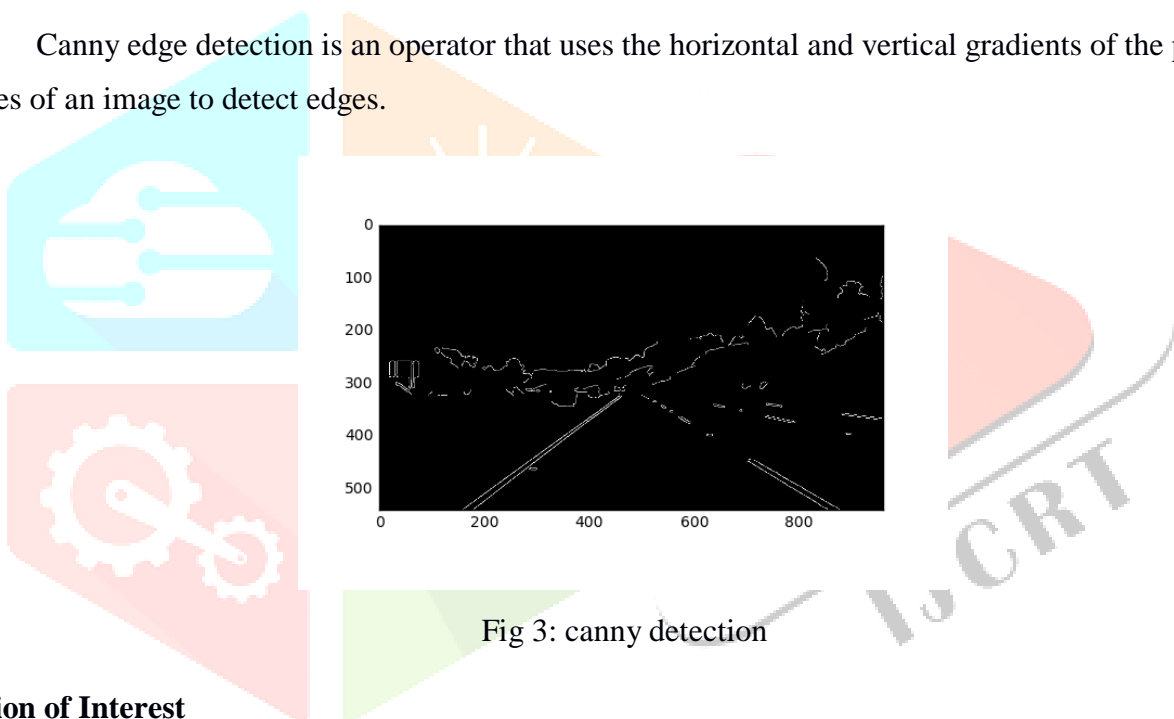


Fig 3: canny detection

Region of Interest

The lines that are not in the region of interest are masked. Also, the region of interest is found by removing unnecessary things present on the road.

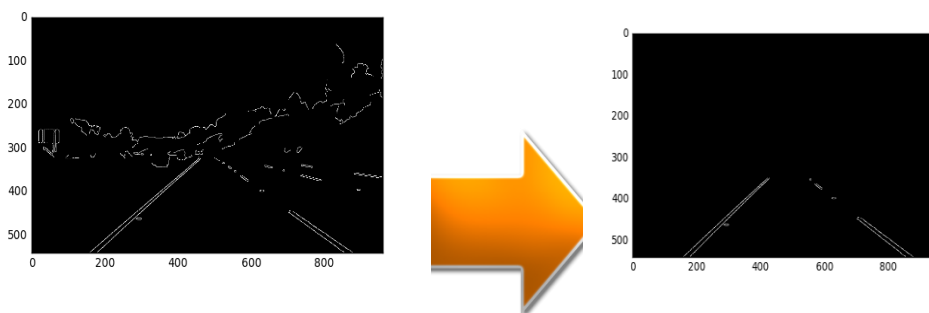


Fig 4: region of interest

Hough Transform

Now that we have detected edges in the region of interest, we want to identify lines which indicate lane lines. Using this technique, we can find lines from the pixel outputs of the canny edge detection output. This finally provides the desired output.



Fig 5: Hough transform

Conclusion

Lane departure warning is an inevitable module in the advanced driver assistance systems. In the last decade several advancements occurred in the lane detection and tracking field. Vision based approach is a very simple modality for detecting lanes. Even though lot of progress has been attained in the lane detection and tracking area, there is still scope for enhancement due to the wide range of variability in the lane environments.

References

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