

Curvature Prediction and Lane Detection on Road using CNN Algorithm

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Abstract

In the field of independent vehicles, Lane identification is viewed as the main part in lessening the quantity of mishaps and dangers. Nonetheless, path discovery is a troublesome issue due to the changing street conditions that one can experience while driving. In this Paper, a profound learning procedure is utilized to identify the curved way in self-governing vehicles. In this venture a tweaked path discovery calculation was actualized to recognize the shape of the path. By planning point to point in each edge 80-90% figuring productivity and precision is accomplished in recognizing way. To accomplish more exactness commotion eliminating channels are utilized.

Keywords— Lane detection, Self-car driving, Curve Prediction, Deep learning

I. INTRODUCTION

In the field of self-governing vehicles path location and curve identification is essential to keep away from the crash. In Prediction of curve way and path identification picture preparing is utilized to improve the picture from input and various tasks are performed on picture to identify the path from the picture and the arch of the path. The path location essentially has three significant advances: Preprocessing, Edge identification and afterward the line location. Edge indicator creates a picture subsequent to separating and result the edges. At that point picture is taken care of for additional line discovery which will locate the privilege and left path limit. The limit in the path utilizes the detail that is acquired in the edge recognized.

II. LITERATURE REVIEW

Byambaa Dorj and Sabir Hossain presented curve path identification calculation dependent on kalman filter in their paper “Highly Curved Lane Detection Algorithms Based on Kalman Filter” [1] This calculation incorporates Otsu’s edge strategy to change RGB over to gray scale image hough change is utilized for recognizing the straight line in the close to field. Further, in “Real time lane detection for autonomous vehicles” [2] by Sheroz khan et al. after change of RGB to gray scale picture F.H.D. algorithm is utilized for more precise edge identification. CCD camera is utilized to catch the picture from front of the moving vehicle. The edge identifier utilized in this calculation and which delivered best pictures from all assessed edge indicators is Canny Edge detector. In [3] ,“A precise lane detection algorithm based on top view image transformation and least-square approach” authors proposed a successful path recognition strategy by utilizing the top view picture change approach. In request to recognize an exact line of the whole path in the changed picture, the top view picture is isolated into two areas, close to picture and far picture. In the close to picture segment, a straight line recognition is performed by utilizing the Hough change,

while, in the far picture segment, incorporating a logical illustrative model methodology and the most un-square assessment strategy to decisively.

G.Pavithra, N.M.Dhanya proposed “Curve path prediction and vehicle detection in lane roads using deep learning for autonomous vehicles.”[4] and execution done through the CNN and the path recognition is done through open cv. This is profound learning calculation utilized less-handling advances picture acknowledgment and vehicle recognition. Disadvantage of this calculation is actualized on open CV not ongoing model. Further, “Curve path detection in autonomous vehicle using deep learning.” by Kodi Balasriram et al [5] is centered principally around the bend way recognition utilizing video/PC vision in which profound learning strategy is utilized. In this paper a tweaked path identification calculation was actualized utilizing ground truth labeler application. According to calculation here handling time is 0.04 sec per outline by that 225 edges each seconds. Hilwadi Hindersah et al discussed in “Implementation of lane detection algorithm for self- driving car on toll road cipularang using python language.” [6] about the after effect of usage of vehicle identification calculation on expressway of self-driving vehicle framework. Video picture made a utilizing move camera mounted on the highest point of the vehicle with 1280*720 goal. The picture handling technique are mix of strategies for object location, include instinct, shading spaces and histogram of situated angle.

In “A computer vision based lane detection approach.” [7] various advances are combined in proposed path recognition framework by authors. The angle and HLS thresholding recognize the path line in two-fold image efficiently. Sliding window search is utilized to perceive the left and right path out and about. The proposed framework is executed in python language with intel center i55200U. Qin Zou et al proposed in “Robust lane detection from continuous driving scenes using Deep Neural Networks” [8] a novel half breed neural organization consolidating CNN and RNN for vigorous path identification in driving scenes. The proposed network designs were based on an encoder decoder system, which accepts various constant casings as an info, and predicts the path of the current casing in a semantic division way.

III. METHODOLOGY

A. Block Diagram:

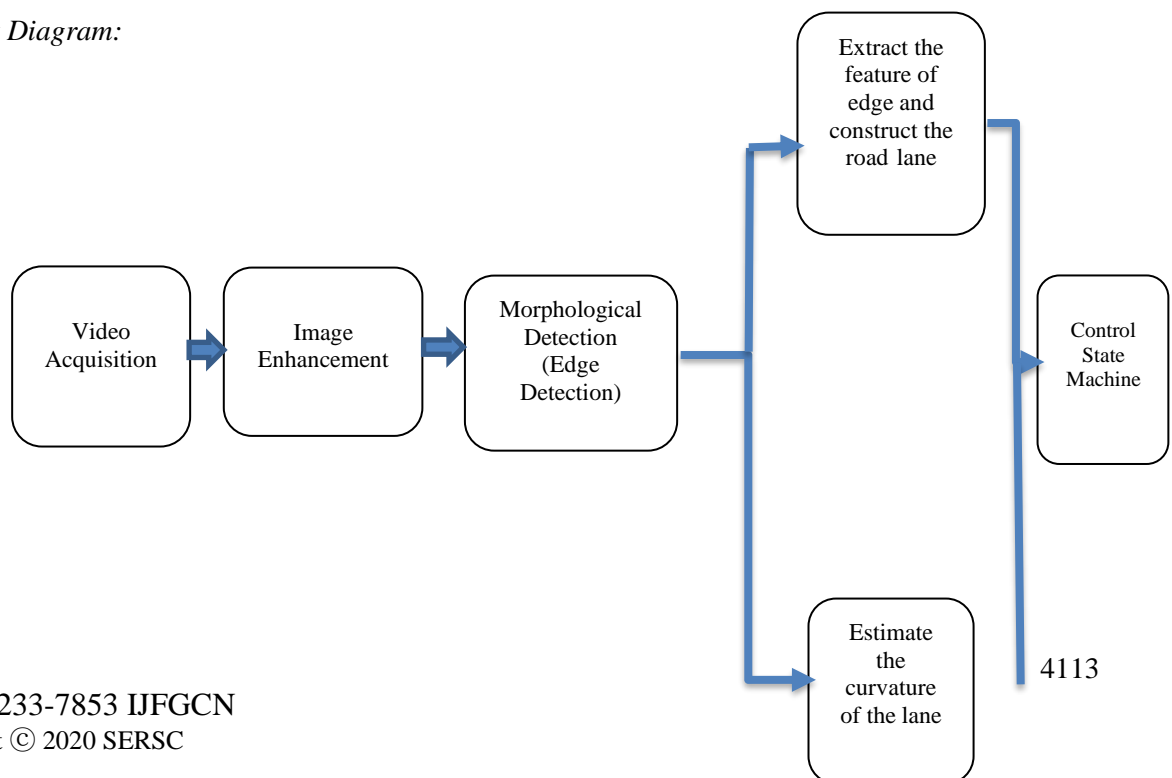




Fig. 1 Block Diagram of Curve Path prediction and lane detection

B. Implementation:

In the implemented system, by using the video acquisition live video has to be recorded. Camera is used for this purpose. Enhancement of image or captured video reduce the processing time and segmented to bit image. The frames are then converted to gray scale. Both the HSV Saturation and the RGB to gray scale conversion are done for the better accuracy. Firstly, edge detector is used to detect the lane in the image. To remove the noise from the image which will reduce the accuracy of image filters are used. After detection of lane extraction of edge is to be done to find the left or right lane. To find the curve of path curvature of lane is calculated which helps to calculate the curve of path.

C. Video Acquisition:

Video acquisition server or a video grabber is used to obtain the video inputs. This video input will be given to system for further processing.

D. Image Enhancement:

Generally, image upgrade is the change or planning of one image to another. image upgrade is the way toward changing computerized images with the goal that the outcomes are more appropriate for show or further image examination. It's likewise utilized for improving the quality and data substance of unique information prior to handling. Image upgrade devices are regularly grouped into point tasks and spatial activities. Point activities incorporate differentiation extending, commotion cutting, histogram adjustment and pseudo shading. Spatial tasks utilized in image handling are regularly straight activities. The justification this that the spatial direct activities are effectively executed. Image improvement procedures are utilized to refine a given image so that ideal image highlights become simpler to see for the human visual framework.

E. Morphological Detection:

It is an image where every pixel esteem demonstrates the difference force in the nearby neighborhood of that pixel.it is helpful for edge location and division applications. Morphological tasks utilize little engineered image called organizing components which are crucial instrument in numerical morphology. Morphological sifting is utilized for spot extraction from the image. The morphological channels are very compelling for smoothing double pictures yet they have other significant applications also. One such application is limit location, which is the parallel instance of the more broad edge indicators.

F. Feature Extracting/ Curvature Estimation:

After the edge identification that edge recognized picture is moved for highlight removing. Based on that shape of the street (if there) is determined. Assuming there is no bend in the separated image, it will pass signal as needs be to the control machine/ yield showing window.

IV. EXPERIMENTATION

Some experiments that are performed at the early stage of implementation are, simply displaying image, conversion of image from RGB to gray, plotting image with the help of matplotlib library and masking of image to find the region of interest which is helpful to detect the lanes without any other objects. To find out the region of interest properly, coordinates of the image should be given so that image can be masked easily. Houghline that is predefined function of python is used to detect the lines in the image that is output of canny edge detection. After doing all this steps lane can be detected in input image.

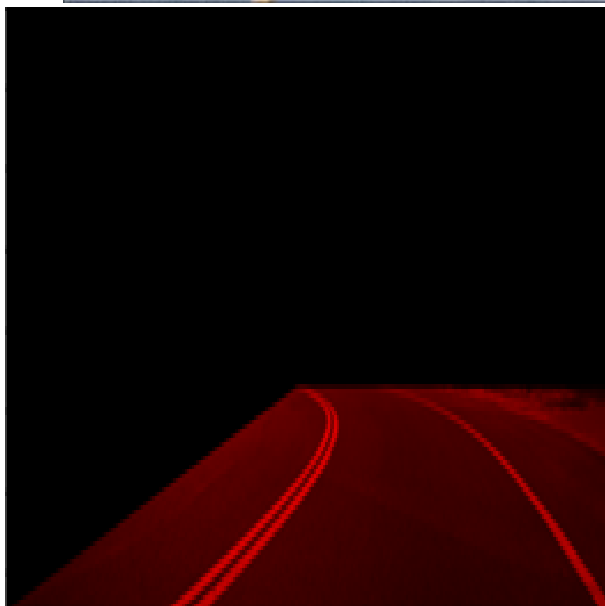


Fig 2. Displaying image with help of opencv library
3 Masking of image for region of interest

Fig.



Fig. 4 Lane Detected in an image

V. RESULT

The result of this experimentation is prediction of the curvature on the road whether it is left curve or right curve and the lane detection which helps users to detect whether they are driving in the right lane or not. In the cases where dead curves are present on the road prediction of curvature is very helpful. Fig 5. Shows the result of experimented lane detection.

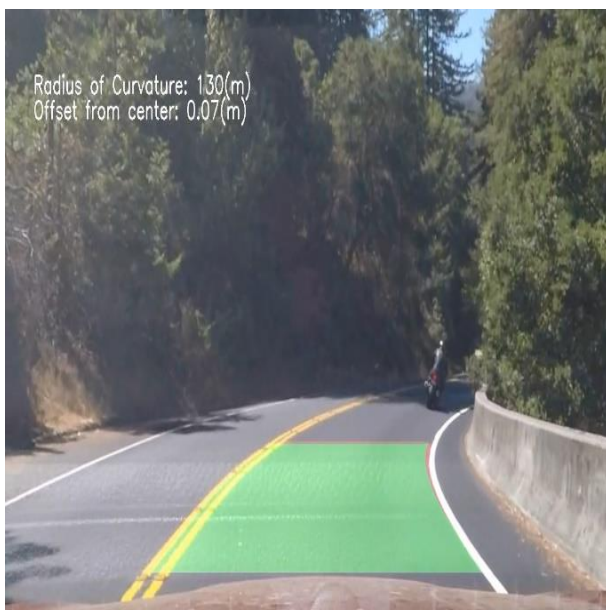


Fig. 5 Above image shows how the system is predicting curvat
6 Above image shows lane detection in night

Fig.

VI. CONCLUSIONS

The Curve path prediction and lane detection plays a vital role in field of self-driving cars and mobile robots. With the help of series of images and Deep learning algorithm it is possible to detect lane and to estimate curvature of path accurately & precisely. In this way the proposed system can Predict the curvature of path and can detect the lane for users. The methods used and proposed for lane detection, the demanding situations and the future scope and their overall performance metrics is likewise provided. despite the fact that numerous new method has been implemented in lane detection, nonetheless trouble exists. most of those hassle happens while in negative environmental condition whilst it fails to locate or in the curvy roads in which detection is simply too tedious. The paper suggests that the CNN performs better in the automobile detection.

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