Road Lane Line Detection

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Abstract — Despite several recent technical advancements in the area of road safety, accidents have risen alarmingly, and driver negligence is one of their primary causes. Technological advances are required to lower the rate of accidents and assure their safety. Another method is to make advantage of such lane detection technique, which warns the drivers when they pass into such an inappropriate lane marker by identifying lane borders on the road. Numerous technologically but not conceptually developed transport systems must include lane-keeping devices. Even though this is a challenging objective given the variety of road surfaces, particularly while traveling at night or in the daylight. The front of the automobile has a sensor that records the road's perspective and can identify lane markings. This study's methodology breaks down video sequences into something like a number of sub-frames, than creates picture characteristics by each sub-frame that are utilized to recognize lanes on roadways. There have been several suggested techniques for identifying lane markers on roadways.

Keywords: Lane Detection, Computer Vision, Traffic Safety

I. INTRODUCTION

Road safety has become increasingly crucial due to the growth in urban traffic. The majority of collisions while driving is caused by drivers who break the rules by leaving their lane. The driver's interruptions and laziness are mostly to blame for all this. Including both automobiles and walkers using the road laws is crucial. Autonomous vehicles can comprehend their environment thanks to machine vision technologies. This is a sub field of AI that assists programs in comprehending video and visual signals. The platform's purpose is to locate surface signs. Its goal is to make the surroundings safe and transportation things better. The suggested platform's capabilities might ranged from presenting road line location to a robots through any external device to some more complex uses like recognizing lane shifts throughout the nearest future in order to prevent road accidents. With lane identification & departing alert system, correct diagnosis of lane paths is critical. Whenever a vehicle violates a lane border, a predict lane border system steers the car to prevent a collision and sends a warning. These smart technologies provide maximum safety throughout all moments, although lane boundaries might not always be readily apparent, since variables like poor road circumstances & inadequate colour on lane markings makes recognition and precise lane recognition through the systems problematic. Additional environmental factors also include reflections 4044 projected by obstacles such as trees or any other automobiles, or 4044 streetlights, daylight and evening situations, or cloudy weather generated by consistent illumination conditions. Users had difficulties separating the road mostly in backdrop from the photographed photo as a result of these circumstances. To address the issues, alter the lane limitations. The technique utilized in this study tries to detect road lane markers by employing machine vision technology to give the systems actual imagery of the road as inputs, with the ultimate goal of minimizing the crash rate. Injuries on the road due by careless driving could be averted by implementing this technology in automobiles and cabs. It will really keep the children secure when riding the school bus. Drivers' behaviour may also be evaluated, and the technology may be utilized by control system and transportation companies to track and notify driver carelessness and inattention on the road

II. ASSUMPTIONS AND DEPENDENCES

A. Assumption:

1) Every roads built must fulfil Highways Authorities standards.
2) The road must be in proper working order. Roads of high grade are required for secure and effective travel.
3) We expect bright weather and most well roadways.
4) Assume the orbit detection method is quick sufficient to have unlimited space.
5) Road lane paint must be visible. 6. Yellow lane Colour: Defines the left side of the start of the road
6) The white tint of the lanes denotes the right side of the road'

B. Dependencies:-

1) GPU computing power is required for the available training data, so the training time of data is directly related or proportional to the original computing power of the particular system.
2) The output of vehicle which has cameras are mounted in motion can have a big impact on the detection results

Weather conditions can also have a big impact on the accuracy of lane detection models, Because of the weather condition lane visibility def deduce. Logical planning depends on the visibility of lanes in:

1) In order to utilize this module, you need the API pre-installed.
2) Updating the operating system's files is mandator.

III. METHODOLOGY

In this project we are using python and OpenCV for determining the trajectory lines in an Image. OpenCV consist several tools that is use for image processing and its abbreviation is "Open-source computer vision"

A. The Canny edge Detection Technique: -

Edge detection is use for determining the boundaries of the object in the image. The region with Sudden intensity change is search by Detection. image is converted in Matrix or an array of the pixel. In an image the intensity of light in a particular location is signify by pixel. The Range of the pixel

varies from 0 to 255, where 0 value of a pixel in an image pixel is completely dark and 255 value of a pixel in an image means pixel is completely white and pattern of pixel od different brightness is called as gradient. The large change is represented by large slope and small change is represented by small slope .in the gradient image there is a vibrant pixel any place there is a surprising shift in depth. By tracking all images pixels, we obtain the edges which is used in our sample image of road to set the rims.

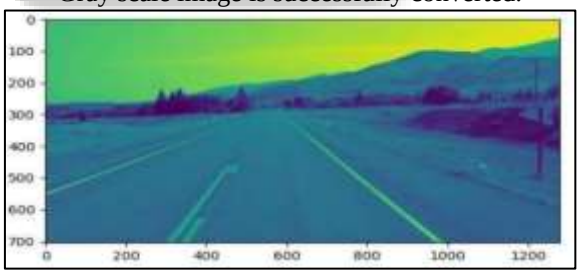
The image is then loaded and processes then convertit into

img = cv2.imread('road.jpg')

After reading the image we must convert the imageinto Gray scale

Img_gray=cv2.cvtColor(img,cv2.COLOR_RGB2GRAY)

Gray scale image is successfully converted.

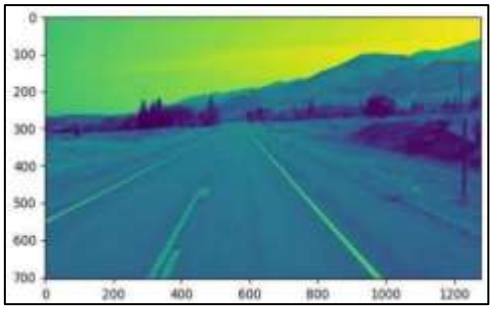


Gaussian Blur: -

Unique number are assign to represent the intensity of each pixel in a grayscale image. smoothing is the main aspect of the image and for this changing value of a pixel is needed by calculating the average of pixel intensities .the noisein the image reduce by kernel considering average of pixels. To smooth image, distributed kernel of number applied by going through each set A to entirepicture with the value of average of image pixels and nearby pixels.

We used 5x5 Gaussian kernel for this process.blur= cv2.GaussianBlur(img_gray, (5,5),0)

Below is the image with reduced noise:

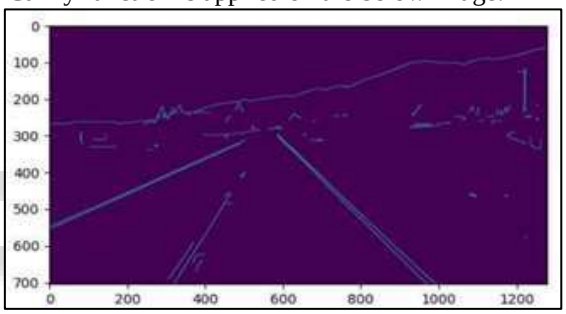


B. Edge Detection: -

In an image edge is define as the areas ofan image. In these areas, changing in intensity or colour is done between the pixels. A steep change isa significant slope, while a shallow change is an opposite The output of all this process is a matrix ofintensity with rows and columns This conclude we can define image in 2D coordinates having columns as width along x axis and having rows as hight of the image. the derivative values present on the x axis and the y axis represent change in brightness between adjacent pixels by using canny functions. We simply calculate the gradient in all directions. In this process the white pixel is having strongest gradient among all.

canny_img = cv2.Canny(blur, 100, 120)

The Canny function is applied on the below image.



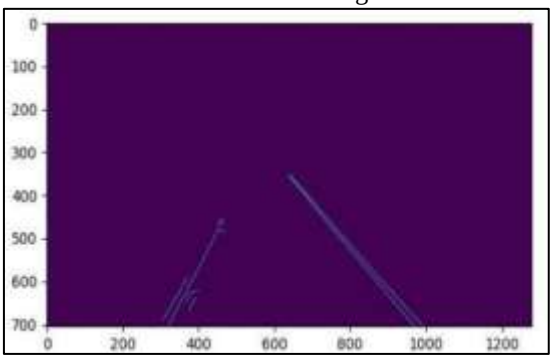
The low threshold and high threshold function is used by considering the strongest gradient to separate pixels of image. If the upper threshold is less than the gradient it set as an edge pixel and if itis greater than it is not allowed to set as an edge pixel. If the gradient is in the range , it is verified if it is connected to strong pixel. If the intensity changeis beyond the threshold then there is a white line delineated location while the small intensity change between the neighbour pixel is completely black area.

C. Region of Interest:

The identification of the area of interest in the image is the main objective of this process. The region must include the traffic lanes and find the area of interest by choosing the dimension of the image. In the image the mask id=s constructed by considering same direction than consist the array having all values zero then the area of interest in this mask is filled with the values 255 so that the area will be white. Then both the fine and the mask image is combine and then AND operation is applied on itto find final region of interest

def region_of_interest(img, vertices) mask = np.zeros_like(img) match_mask_color = 255 cv2.fillPoly(mask, vertices, match_mask_color)masked_img = cv2.bitwise_and(img, mask) return masked_img

cropped_img = region_of_interest(canny_img, np.array ([region_of_interest_vertices], np.int32)) here is the result after manipulating the smart imageand the mask image and this result is called asmasked image.



D. Hough Transform: -

The straight lines in the image is utilizedto determine the trajectory line by Appling Hough transformation method
The following question represent a trajectory liney= mx + b.

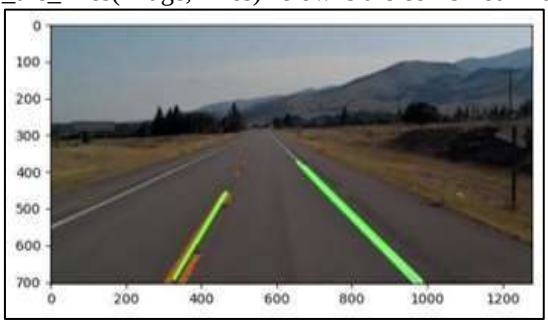
Climb is nothing but the slope of the line . by using the intercept and slope line , the line can be drawn inhough space .we can pass infinite number of line through this point having distinguish values .different lines are used to intersect each point with different slope and intercept values. Meanwhile lines combine the two sites. The 'm' and 'b' values that going through two positions in Hough space is used to figure out lines by considering this value. Bydividing the Hough space into the grid we can recognize lines. The boxes of the grid represents theslope and the co ordinate value of the respecOve lines. The axis contribute their votes to every intersection of the Hough Space to which it belongs. Majority of votes is used to drawn lines from the bins. On the other hand, vertical line has infinite slope. That's why polar co=ordinates is used to showa vertical line as compared to Cartesian co ordinate.

By this process, the equation of line becomes: def draw_the_lines(img, Lines):

img = np.copy(img) blank_img=np.zeros((img.shape[0], img.shape[1],3), dtype=np.uint8)

for line in Lines: for x1, y1, x2, y2 in line: cv2.line(blank_img, (x1, y1), (x2, y2), (0, 255, 0), thickness=4)

img = cv2.addWeighted(img, 0.8, blank_img, 1, 0.0) return img lines = cv2.HoughLinesP(cropped_img, rho=2, theta=np.pi/60, threshold=50, lines=np.array([]), minLineLength=40, maxLineGap=80) img_with_lines = draw_the_lines(image, lines)Below is the combined image:



IV. CONCLUSIONS

We employ edge detection approach like the Cannyfunction and also the OpenCV library. Furthermore, using a zero-intensity mask, we have used bitwise approach to map our region of interest. The next procedure is to identify trajectory lines and findstraight lines in the image by using Hough Transform approach. Because Cartesian coordinatesdo not give adequate slope for vertical and horizontal lines, we employ polar coordinatesinstead. In order to see the trajectory lines, we finally integrate the original image with our zero-intensity image

V. FUTURE WORKS

We deploy edge detection algorithms like the Canny function and also the OpenCV library. Furthermore, using a zero-intensity mask, we have used bitwise approach to map our region of interest. The next phase involves identifying trajectory lines and detect straight lines in the image through using Hough Transform algorithm. Because Cartesian coordinates do not provide adequate slope for vertical and horizontal lines, we employ polar coordinates instead. In order to see the trajectory lines, we finally integrate the original image with our zero-intensity image and cannot name the sandyroads that are ubiquitous in all Indian communities. The project might be enhanced as a consequence to detect and eliminate the dirt road accidents discovered in the neighbourhood.

REFERENCE

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