Group Details

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Name of the topic: Lane Line Detection System Using python and Opencv

Problem Statement: Lane Line Detection System Using python and Opencv

Introduction:

We have created an intelligent system which can detect lane-line on

the roads. This system will be able to detect lane –line on images and videos.

Our intention is to build system which can detect lane-line on the roads

in real time. To identify lane lines on the road OpenCV is used. The OpenCV tools like the region of interest selection, grey scaling, Gaussian smoothing, Canny Edge Detection, and Hough Transform line detection are being employed. The goal is to piece along a pipeline to detect the line segments within the image, then average/extrapolate them and draw them onto the image for the show.

Motivation:

When we drive, we use our eyes to decide where to go. The lines on the road that show us where the lanes are act as our constant reference for where to steer the vehicle.

Naturally, one of the first things we would like to do in developing a self-driving car is to automatically detect lane lines using an algorithm.

This intelligent system can be used as subsystem for self-driving car.

Better the detection of lane-line better is the performance of self-driving

car.

Objectives

1. Extract images from input video and using Opencv tools detect lane line on the road
2. Draw the lane line on the video in real time.

Methodology

* **Capturing and decoding video file:** We will capture the video using VideoCapture object and after the capturing has been initialized every video frame is decoded (i.e. converting into a sequence of images).
* **Reduce noise:** Noise can create false edges, therefore before going further, it’s imperative to perform image smoothening. Gaussian filter is used to perform this process.
* **Grayscale conversion of image:** The video frames are in RGB format, RGB is converted to grayscale because processing a single channel image is faster than processing a three-channel colored image.
* **Canny Edge Detector:** It computes gradient in all directions of our blurred image and traces the edges with large changes in intesity.
* **Region of Interest:** This step is to take into account only the region covered by the road lane. A mask is created here, which is of the same dimension as our road image. Furthermore, bitwise AND operation is performed between each pixel of our canny image and this mask. It ultimately masks the canny image and shows the region of interest traced by the polygonal contour of the mask.
* **Hough Line Transform:** The Hough Line Transform is a transform used to detect straight lines. The Probabilistic Hough Line Transform is used here, which gives output as the extremes of the detected lines

Result

The system is able to detect the lane line in abundunt light, however its efficiency wiil reduce if visibility reduces(e.g in night or too much fog in the air)

Application

1. It can do realtime lane line detection so ,This system can be used in self driving car as a subsystem.
2. It can also be used to train model of self driving car and enhancing the overall performance.

Conclusion

In this project using Opencv we have created a lane line detection system which can detect lane line on the roads in realtime. It can also reduce noise in input video to some extenet thus giving better perfrmance.

Screenshots

*Input*