Project -
Lane Line Detection System

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CS (CC)

Introduction:

Autonomous Driving Cars are one of the most disruptive innovations in AI. Fuelled by Deep Learning algorithms, they are continuously driving our society forward and creating new opportunities in the mobility sector. An autonomous car can go anywhere a traditional car can go and does everything that an experienced human driver does. But it's very essential to train it properly. One of the many steps involved during the training of an autonomous driving car is lane detection, which is the preliminary step. Today, we are going to learn how to perform lane detection using videos.

Lane detection involves the following steps:
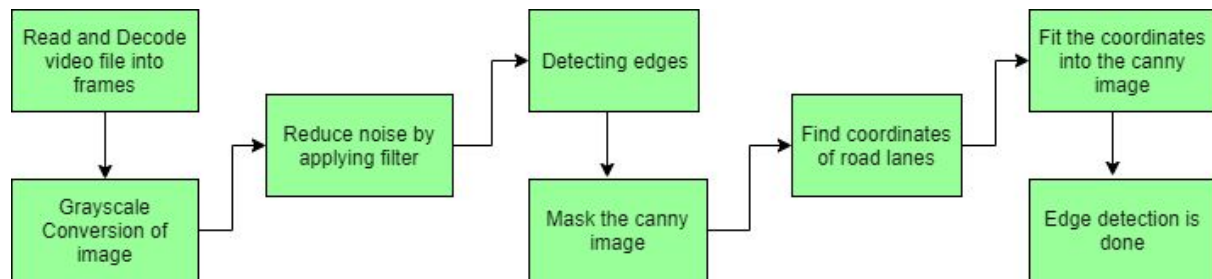
- **Capturing and decoding video file:** We will capture the video using VideoCapture object and after the capturing has been initialized every video frame is decoded (i.e. converting into a sequence of images).

- **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 color image.

- **Reduce noise:** Noise can create false edges, therefore before going further, it's imperative to perform image smoothening. A Gaussian filter is used to perform this process.

- **Canny Edge Detector:** It computes gradient in all directions of our blurred image and traces the edges with large changes in intensity.

- **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.
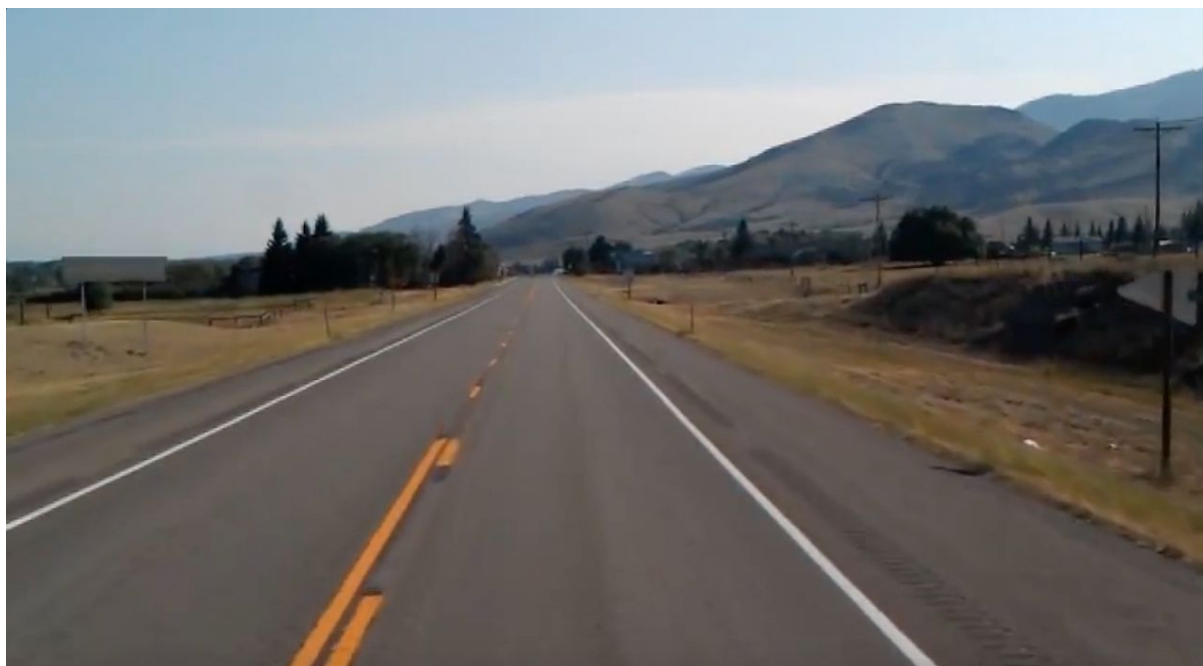
Dataset:

The dataset consists of the video file of a road which will be used as an experiment to detect lanes in the road.
An image is also provided as we can perform the experiment on the image as well.

Libraries Involved:

- Libraries required for this task:NumPy: It comes by default with anaconda
- Matplotlib: To install matplotlib, type – "pip install matplotlib" into your command line
- OpenCV: It can be installed in two ways, using anaconda or using pip.
  To install using anaconda, type- "conda install -c conda-forge opencv", or to install using pip, type-
  "pip install opencv-python" into your command line

INPUT:

OUTPUT: