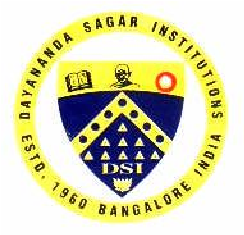
Dayananda Sagar College of Engineering



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**(An Autonomous Institute affiliated to VTU, Approved by AICTE & ISO 9001:2008 Certified)**

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**Assignment**

Program: B.E. Branch: ECE

Course: Machine Learning Semester : 7

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**A Report on**

# Road Lane-Line Detection

**Machine Learning Assignment**

## Submitted by

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INTRODUCTION

Road lane detection is a crucial component of advanced driver assistance systems (ADAS) and autonomous vehicles. It involves the use of computer vision and image processing techniques to identify and track the lanes on a road. The primary goal is to provide accurate information about lane boundaries to assist in vehicle navigation, lane-keeping, and decision-making.

Objective:

The primary objective of road lane detection is to identify and track the lanes on a road accurately. This technology is employed in various contexts, including advanced driver assistance systems (ADAS) and autonomous vehicles, to enhance safety, improve driving experience, and enable more efficient and intelligent vehicle control. Here are the key objectives of road lane detection:

**Lane Keeping Assistance**: Assist drivers in maintaining their vehicles within the boundaries of the designated lanes.

Benefit: Reduces the risk of unintentional lane departures, which can lead to accidents, especially in situations where a driver may be fatigued or distracted.

**Autonomous Driving**: Provide a fundamental input for autonomous vehicles to understand their position on the road.

Benefit: Enables the vehicle to navigate and make decisions based on the detected lanes, contributing to safe and reliable autonomous operation.

**Safety Enhancement :** Enhance road safety by implementing lane departure warning systems.

Benefit: Alerts drivers when they are about to leave their lanes without using turn signals, preventing potential collisions or accidents.

**Traffic Management**: Contribute to efficient traffic flow and management.

Benefit: Supports systems that optimize traffic signals or provide information to traffic management centers based on real-time lane occupancy and traffic patterns.

**Driver Assistance** : Assist drivers in making informed decisions.

Benefit: Provides visual and sometimes audible cues to the driver, aiding in navigation, reducing cognitive load, and improving overall driving experience.

**Adaptation to Road Conditions :** Adapt to different road conditions and environments.

Benefit: Lane detection systems should be robust enough to perform well under various scenarios, including different weather conditions, lighting conditions, and road markings.

**Real-Time Responsiveness** : Ensure real-time processing for timely responses.

Benefit: Enables quick detection and tracking of lanes, essential for applications like autonomous driving where split-second decisions are required.

**Integration with Other ADAS Features** : Collaborate with other ADAS features for comprehensive safety.

Benefit: Lane detection is often integrated with features like adaptive cruise control, collision avoidance, and parking assistance, creating a comprehensive safety net for drivers.

In summary, the objectives of road lane detection are centered around safety, navigation, and overall improvement of driving conditions. These objectives contribute to creating a more efficient, secure, and user-friendly transportation environment.

Algorithm implemented:

1. Hough Transform
2. Canny Edge Detector:
3. Sobel Operator:
4. Sliding Window Technique:
5. Kalman Filter
6. Histogram-based Lane Detection

Program:

import cv2

import numpy as np

img=cv2.imread('4-lane-road-increase-land-prices.png')

gray = cv2.cvtColor(img,cv2.COLOR\_BGR2GRAY)

blur=cv2.GaussianBlur(gray,(5,5),0)

edges=cv2.Canny(blur,50,150)

mask=np.zeros\_like(edges)

height,width=mask.shape

polygon=np.array([[(0,height),(width,height),(width//2,height//2)]])

cv2.fillPoly(mask,polygon,255)

masked\_edges=cv2.bitwise\_and(edges,mask)

lines=cv2.HoughLinesP(masked\_edges,rho=6,theta=np.pi/60,threshold=160,lines=np.array([]),minLineLength=40,maxLineGap=25)

line\_img=np.zeros\_like(img)

for line in lines:

x1,y1,x2,y2=line[0]

cv2.line(line\_img,(x1,y1),(x2,y2),(0,0,255),10)

result=cv2.addWeighted(img,0.8,line\_img,1.0,0.0)

cv2.imshow('Result',result)

cv2.waitKey(0)

 Output shows the activity done by the driver, the prediction list is raised to 1 for the detected event/action.

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Fig 2.1: Input dataset images



Fig2.2: Output dataset Images

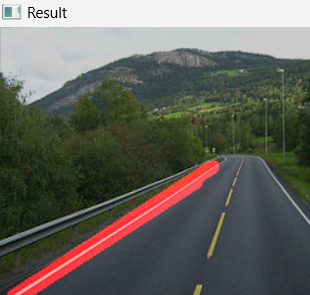


Fig3.1: Input Image Fig3.2: Output Image

References:

1. Y. He, B. Wu, and H. Huang, "Driving behavior recognition based on deep convolutional neural networks," in Proceedings of the IEEE Intelligent Vehicles Symposium (IV), 2017, pp. 1-6. DOI:

10.1109/IVS.2017.7995909.

1. J. Zhang, W. Luo, and Y. Wang, "Driver drowsiness detection based on convolutional neural networks," in Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2018, pp. 2602-2608. DOI: 10.24963/ijcai.2018/362.

1. C. Chen, A. Seff, and A. Kornhauser, "DeepDriving: Learning Affordance for Direct Perception in Autonomous Driving," in Proceedings of the Conference on Computer Vision and Pattern Recognition (CVPR), 2015, pp. 2722-2730. DOI: 10.1109/CVPR.2015.7298890.

1. G. Li, X. Chen, and Y. Li, "A sequential model for real-time driver activity detection using CNN," IEEE Transactions on Intelligent Transportation Systems, vol. 20, no. 5, pp. 1785-1795, May 2019. DOI:

10.1109/TITS.2018.2851524.

1. H. Wang, J. Kim, and S. Kim, "Driver activity recognition using a hybrid deep learning model," IEEE Sensors Journal, vol. 18, no. 14, pp. 5977-5985, July 2018. DOI: 10.1109/JSEN.2018.2825259.

1. H. Zhang, Y. Sun, and Y. Wang, "Driver activity recognition based on CNN with long short-term memory," IEEE Access, vol. 8, pp. 135528-135536, 2020. DOI: 10.1109/ACCESS.2020.3017691.

1. S. Kim, J. Lee, and H. Myung, "Real-time driver behavior recognition using convolutional neural networks," in Proceedings of the International Conference on Intelligent Transportation Systems (ITSC), 2016, pp. 1795-1800. DOI: 10.1109/ITSC.2016.7795787.

1. Y. Chen, J. Wu, and W. Yin, "Driver inattention monitoring system using a hybrid deep learning architecture," IEEE Transactions on Intelligent Transportation Systems, vol. 21, no. 5, pp. 1885-1894, May 2020. DOI: 10.1109/TITS.2019.2929632

.

1. X. Wang, Y. Wu, and H. Wang, "Driver fatigue detection using a sequential convolutional neural network," IEEE Sensors Journal, vol. 20, no. 20, pp. 11953-11962, Oct. 2020. DOI: 10.1109/JSEN.2020.2992692.

1. A. Gupta, R. S. Jadon, and M. K. Tiwari, "CNN-based driver activity recognition for autonomous vehicles," in Proceedings of the International Conference on Machine Learning and Applications (ICMLA), 2019, pp. 1222-1227. DOI: 10.1109/ICMLA.2019.00197.