



LANE LINE DETECTION USING IMAGE PROCESSING FOR AUTONOMOUS VEHICALS

¹k.Naveen, ²A.DineshkumarReddy,³D.Saikrishna,⁴G.Ganeshpavansai,

Prof, ECE Dept, RISE Krishna Sai Prakasam Group of Institution, Ongole-523001, AP

^{1,2,3,4}B.Tech final year students, ECE Dept, RISE Krishna Sai Prakasam Group of Institution, Ongole-523001, AP

([1](mailto:kandimallanaveen265@gmail.com)kandimallanaveen265@gmail.com;[2](mailto:ambatidineshkumarreddy31@gmail.com)ambatidineshkumarreddy31@gmail.com;
[3](mailto:sk695749@gmail.com)sk695749@gmail.com;[4](mailto:gollakaramganeshpavansai@gmail.com)gollakaramganeshpavansai@gmail.com;))

Abstract—Computer vision techniques are gaining interest in precision agriculture for detecting and weeding objects of interest, such as crops, to improve crop yields and reduce nutrient, water, and sunlight competition.. Weed detection and mapping is critical for site specific weed management to reduce the cost of labor and impact of herbicides. This paper investigates the use of color and texture features for discrimination of Soybean crops and weeds. Feature extraction methods including two color spaces (RGB, HSV), gray level Co-occurrence matrix (GLCM),and Local Binary Pattern (LBP)are used to train the Support Vector Machine (SVM) classifier. The experiment was carried out on image dataset of soybean crop, obtained from an un vehicle(UAV),which is publicly available.There sults from the experiment showed that the highest accuracy (above 96%) was obtained from the combination of color and LBP features. Index Terms—Crop/weed classification, Color features, Gray Level Co-occurrence matrix (GLCM), Local Binary Pattern (LBP), Support Vector Machine (SVM)

INTRODUCTION

Car companies worldwide have been dreaming of self-driving cars since the emergence of cars. In the past two years, technology companies have been working on this, using deep learning and image processing to take over human drivers' actions, providing safer and more reliable travel. This progress has gained strength in the automotive industry.

Self-driving cars have been a dream for all car companies in the world and many of these companies have tried to get a self-driving car almost since the emergence of cars, cars have already started to gain strength in the past two years, as many technology companies are moving in this matter, self-driving cars use a mixture of deep learning, Image processing and many other areas to take over the actions of the human driver, providing safer and more reliable travel. There are many other important benefits, including the ability to reduce traffic congestion and the possibility of reducing pollution if concepts such as car rides continue to increase in use. Our motivation in this research is to use the methods of image processing techniques to build a program with the ability to direct the car in the right direction in the roads and also deep learning methods to build a program



LITERATURE SURVEY:

Topic: Research on experiment of road marking detection based on improved Canny edge detection algorithm.

The road monitoring system's video images are distorted by noise, blurring the distinction between the lane and the back ground. The lane detection algorithm based on traditional Canny edge detector hardly detects the single-pixel lane accurately and it produces pseudo lane. The paper proposes an effective lane detection method based on improved Canny edge detector and least square fitting. The proposed method improves the dual-threshold selection of traditional Canny detector by using the histogram concavity analysis, which sets the optimal threshold automatically. The least square method is used to fit the feature points of detected edges to accurate and single-pixel wide lane. Experimental results show that the proposed method detects the lane of video images accurately in the noise environment.

Merits:

By employing adaptive filters like the bilateral filter or wavelet-based

Demerits:

Suboptimal parameter settings can lead to inaccurate or incomplete edge detection.

Topic: A Research of Lane Detection and Tracking Based on Machine Vision

The paper proposes a lane information extraction algorithm using Gabor filters, which have excellent recognition characteristics for road texture information, to address traffic safety issues due to the increasing number of vehicles.

Using a well-established test set for detection experiments, the lane detection aspect of the algorithm was tested with a false detection rate of 1.9%, which is 0.9% higher than the existing RANSAC lane fitting algorithm. The algorithm used in this paper is feasible.

Merits:

Autonomous vehicles can rely on these systems for safe navigation and decision-making.

Demerits:

Poor lighting conditions, such as nighttime or tunnels, can also impact the accuracy of lane detection.

Topic: Adaptive Canny edge detection algorithm

This paper combines global and local edge detection methods to address edge missing problems caused by single edge detection methods. The global edge detection can obtain the whole edge, which uses adaptive smooth filter algorithm based on Canny operator. Compared with effect of edge detection from the Canny operator and Sobel operator, the edge from improved Canny operator is the most complete and rich, do not contain false edge. To the whole detection failed to get the edge, the paper selects local area detection method for edge extraction. Local edge detection which uses distance weighted average method based on k-average method can overcome the impact of outliers on clustering effectively. Complete skull image edge is got through edge detection method that combines global with local. Compared

with the Canny edge detection method, this algorithm can extract image edge effectively, and have the powerful anti-noise ability.

Merits:

Dynamically adjusting thresholds and filtering parameters, the algorithm can handle varying noise

supports new research works in this automation field. For further study, it is suggested to put more effort into accuracy improvement, increased speed performance, and more challenging work on various extreme conditions in detecting the road lane.

Merits:

These systems can detect a collision early, triggering immediate deployment of safety features like airbags and seatbelt pre tensioners. This rapid response significantly reduces the risk of severe injuries.

Demerits:

Crash detection is a systems depends on complex sensors, control modules, and software. This increases the overall cost of vehicles, making them less affordable for some consumers

EXISTING SYSTEM:

Lane line detection using image processing and histogram equalization improves visibility of lane markings under different lighting conditions. The process involves converting a roadway image to gray scale, then applying histogram equalization to adjust contrast, making faint or obscured lane lines more visible. This contrast enhancement is especially beneficial for images with uneven lighting, such as shadows or glare.



Fig 1: Existing System

Data Acquisition:

Lane line detection for autonomous vehicles refers to the process of gathering real-time data from various sensors and sources to help the vehicle understand its environment and detect lane markings.

Image Compression :

The process of reducing the file size of an image while preserving its quality as much as possible. The goal is to make the image easier to store, transmit, and process, especially in applications like web pages, media sharing, and autonomous vehicle systems.

Histogram:

A histogram is a graphical representation of the distribution of data. In the context of images, a histogram shows the distribution of pixel values (intensities) in an image, typically with respect to brightness or color.

Histogram Equalization:

Histogram Equalization is a technique in image processing used to improve the contrast of an image by redistributing its pixel intensity values. The idea is to transform the image so that its histogram (the distribution of pixel intensities) is spread out as much as possible, often using the full available range of intensities.

Output Image:

The image is clearly visible than the previous image the pixels are reduced and the blur is also removed and the accuracy is increased.

PROPOSED SYSTEM

At present, the detection of lane lines is mainly realized based on the edge information of the lane lines. Usually use the Sobel algorithm, Canny algorithm, and other algorithms for edge detection. The fitting of lane lines usually adopts Hough transform, Radon transform, and so on. However, the applicability of this algorithm is not high, and the parameters need to be adjusted artificially for different images. Therefore, this paper proposes a straight-line detection method based on the Otsu-Canny.

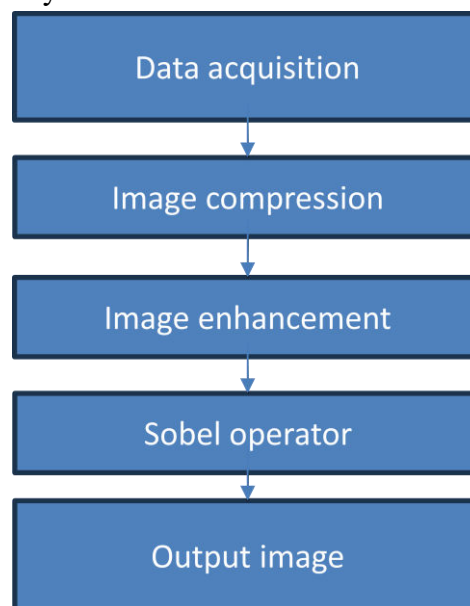


Fig: 2 proposed system

Data Acquisition:

Lane line detection for autonomous vehicles refers to the process of gathering real-time data from various sensors and sources to help the vehicle understand its environment and detect lane markings.

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Image Enhancement:

The image is enhanced when we checked with the previous image the blur is removed and the image quality is increased.

Soble operator:

The Sobel operator is a widely used edge detection operator in image processing. It is used to identify the edges in an image by calculating the gradient of image intensity at each pixel.

Output image:

The accuracy of the image is increased and the image quality is increased error of reduction is reduced and accidents also reduced.

RESULT:



Fig.3 Input image

The image shows a highway with multiple lanes. Lane line edge detection is a technique used to identify the edges of the lane markings on the road. This is done by analysing the changes in colour or intensity between the lane markings and the surrounding road surface. Edge detection algorithms can be used to create a digital representation of the lane lines, which can then be used for various purposes, such as autonomous driving or lane departure warning systems.

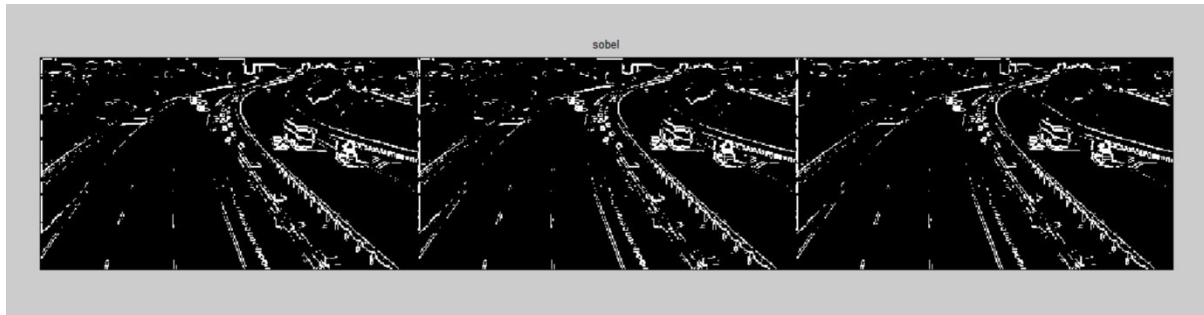


Fig. 4 Sobel operator using edge detection output image

The image can see the edges in the road image. It's like the is using a special filter to highlight the places where the brightness changes suddenly, which helps it understand the road and the objects on it. The car can use this information to navigate and stay in its lane. The edges of objects can help identify and track vehicles and other objects on the road. It does this by calculating the gradient of the image in the x and y directions.

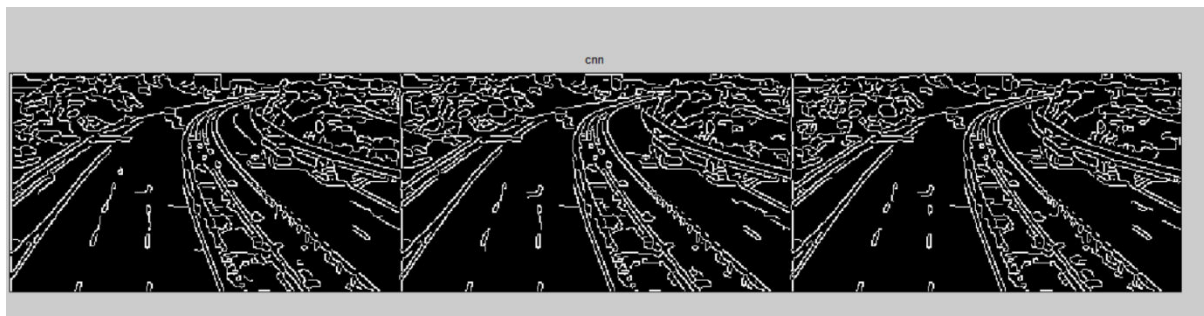


Fig. 5 canny operator using edge detection output image

The canny operator is used to more Smoother than the Sobel operator .It first smooth out the image to get rid of any noise or small variations in brightness that might confuse the edge detection process. It calculates the gradient of the image, which tells us how quickly the brightness is changing in different directions. This helps identify potential edges. This step "thins out" the edges. It only keeps the pixels with the strongest gradient along the direction of the gradient. This helps to get rid of road edges and makes the edges more clear .The white lines highlight the edges detected by the Canny edge detector. These edges correspond to the lane markings, the edges of the road, and the outlines of the vehicles. The Canny edge detector is known for producing clean and well-defined edges.

CONCLUSION:

Lane line detection is a crucial technology for enabling autonomous vehicles to navigate safely and efficiently. By accurately identifying lane boundaries, it supports various applications such as lane keeping assistance, adaptive cruise control, autonomous merging, and collision avoidance. This technology enhances vehicle positioning, improves safety, and aids in driver assistance systems, contributing to overall functional ie of a autonomous driving. As it continues to evolve, lane line detection will play an increasingly important role in the development of fully autonomous vehicles, ensuring safer and more reliable transportation.



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