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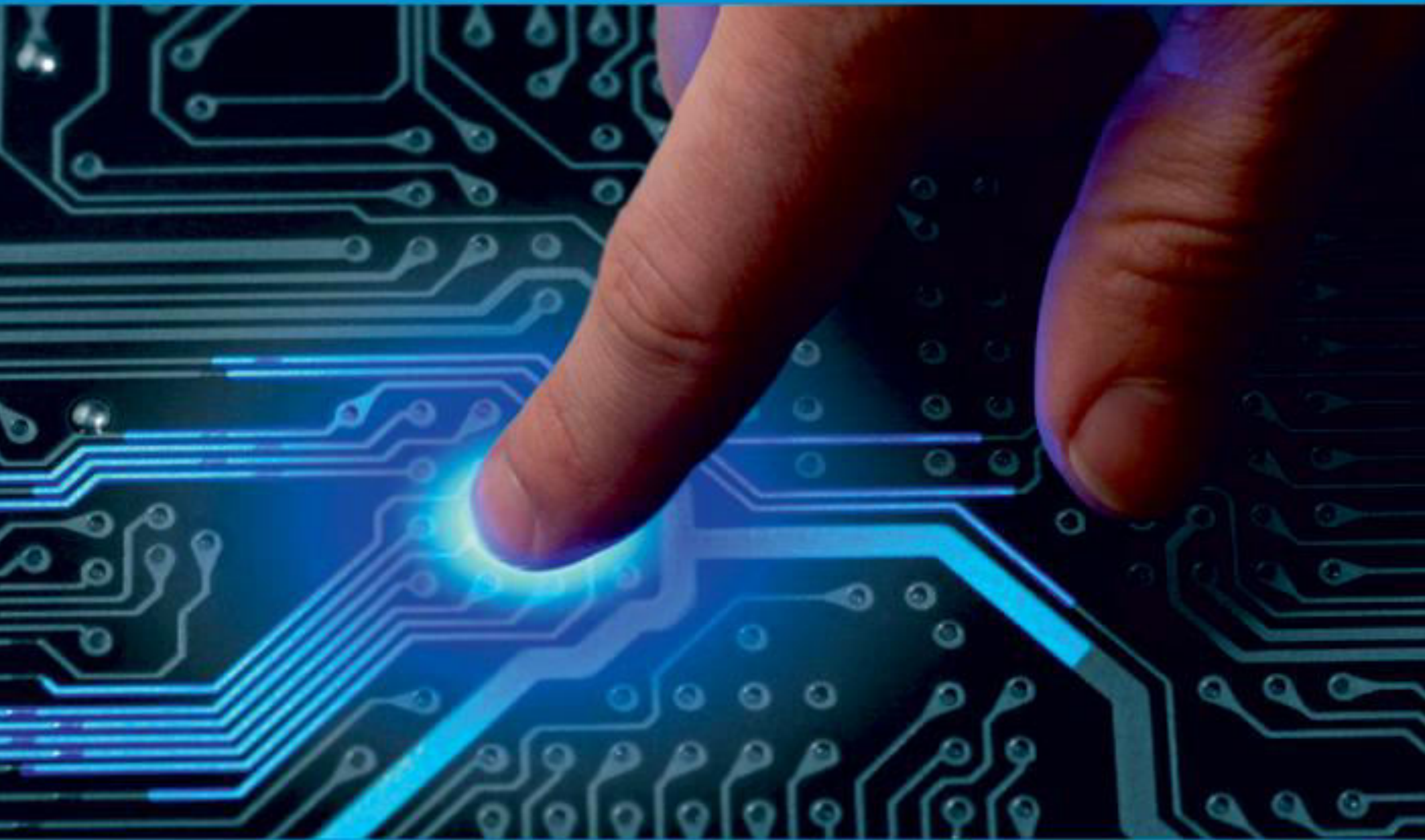

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Alley Lane Line Detection using Sliding Window Algorithm

K . Parisuddha Babu[1], Turlapati Dileep[2], SK Basheer Mohammad[3], Vankayalapati Sai Dhronith[4]

Assistant Professor, Department of INF, Vasireddy Venkatadri Institute of Technology, Nambur, Guntur Dt., Andhra Pradesh, India[1]

UG Students, Department of Information Technology, Vasireddy Venkatadri Institute of Technology, Nambur, Guntur Dt., Andhra Pradesh, India[2,3,4]

ABSTRACT: Traffic accidents are become fairly commonplace. As more and more individuals own cars, the frequency of traffic incidents is rising daily. The law of the road is not being observed by many people. There are many different forms of transportation, particularly in large cities. In addition, cities are populating more densely and highways are getting smaller. Lane line tracking detection technology is employed to solve this issue. Alley Lane Line Detection is a quick and accurate method for finding advanced driving aids. A crucial part of computer vision and self-driving automobiles is lane line detection. To prevent the danger of entering another lane, this model is used to represent the route taken by self-driving or ADAS vehicles. The Sliding Window method is used in the lane detection approach to gather candidate points along the lane lines, and the Hough transform is used to identify lane features. This algorithm locates the borders of lane lines on the road and shows the driver the direction of the lane. The motorist may easily avoid entering another lane route by recognising his or her own lane path.

KEYWORDS: Deep Learning, Curve Detection

I.INTRODUCTION

One of the major issues in the world today is traffic accidents. Roads are the most convenient form of transportation since they offer great communication along all routes. Driver irresponsibility is the most prevalent traffic issue, and it is getting more and harder to solve as traffic volume rises. With the aid of sidewalks or white lines that make it easier for drivers to view the road surface and off-road area, these traffic accidents can be decreased. The lane is a designated section of the road that may be utilised by a single line of cars to direct and regulate traffic and lessen gridlock.

II.LITERATURE SURVEY

[1] The article offers methods for enhancing a tracking system's precision and speed while detecting objects in an input image. The Area of Interest (ROI) is shrunk, either manually or by utilising camera measurement parameters, to remove unneeded objects. The route acquisition procedure can be made simpler by converting the colour image to grayscale. It is possible to utilise blurring to enhance traffic route recognition. Track markers are retrieved using a dynamic boundary with adaptive threshold adjustments, and the image is divided into the left and right halves. On each image, the locations of straight lines in relation to the lines are derived using the low-adjusted Hough alignment. These methods can improve the tracking system's speed and accuracy when identifying objects in an input image.

[2] This article looks at ways to use computer vision techniques to increase the precision and speed of route recognition. Due to intermittent internet connectivity or poor GPS signal, the existing reliance on GPS maps for route recognition can be problematic. The suggested approach uses parallelogram ROI and probabilistic Hough transform, which reduces operation time by roughly 30% and boosts accuracy by up to 3%. The algorithm's rigidity in adjusting for the distance between traffic signs and the wrong rectangular size, however, was discovered to have limitations. Future work might involve creating a flexible algorithm that can modify the rectangle's size in accordance with the location of the car. The essay shows how computer vision algorithms have the potential to enhance current route detection techniques.

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[3]The article suggests a road-based speed control approach for heavy trucks that may be used to any binding system that can accept binding or outer position commands. Using a speed and space control approach, the system strengthens the vehicle's sidewalk by moving it to the middle of the lane and giving it a correct title so that it stays there. By employing a forward feeding strategy depending on the necessary attack angle, the controller also permits the vehicle to handle a turn of the road while maintaining track of the route's centre line. A big vehicle was used for testing a new Lane Keeping Assist (LKA) system that was integrated into the torque detection system, which improved route tracking and turning. Driving big vehicles could become more effective thanks to these advancements, which can also be used in personal automobiles.

[4]This research suggests a flexible control strategy for a lane departure assistance system that will keep the car on course. The strategy comprises establishing a response strategy that removes the driver only when necessary and using a stable fixed control set, where inputs can keep the automobile on course. The paper also covers the pre-processing, detecting, and tracking aspects of route detection and tracking systems in the context of intelligent transportation systems. To aid in the design of new systems that enhance existing structures, the benefits and drawbacks of each system are discussed.

[5]The method for detecting automobiles in front of a car at night while driving is suggested in the research using image separation methods and pattern analysis. A multi-level limit-based separation approach is used to extract the relevant luminous objects. By identifying and examining local and transient aspects of vehicle patterns and calculating their distances from the car using a camera, the article analyses exhaust emissions and tracks the vehicles. The suggested methods are integrated into a nearby ARM-Linux embedded platform and input devices, such as image equipment, voice reporting modules, and vehicle controlling devices. The technology is created to work in real-time and to be mounted in the vehicle.

III. PROBLEM IDENTIFICATION

They presented an application that uses image-based technology in an existing system since it is challenging to identify lane lines alone from photos. They employed the SVM technique to recognize lane lines.

SVM Algorithm:
Support Vector Machine (SVM) is a learning technique that can be read by machines and is effective in splitting, retrieving, and detecting. A straight line connecting the two classes is drawn using the support vector machine section line. All of the data points on one side are grouped into one category, while all of the data points on the other side are grouped into a different category. While there are an endless number of lines to choose from, it seems straightforward.
The SVM method will choose a line that, in addition to dividing the two classes, remains as far away from the samples as it can. In reality, the word "supporting vector" in the phrase "support vector machine" refers to two vertices vectors taken from the starting point to the decision-making point.

DESIGN ARCHITECTURE:

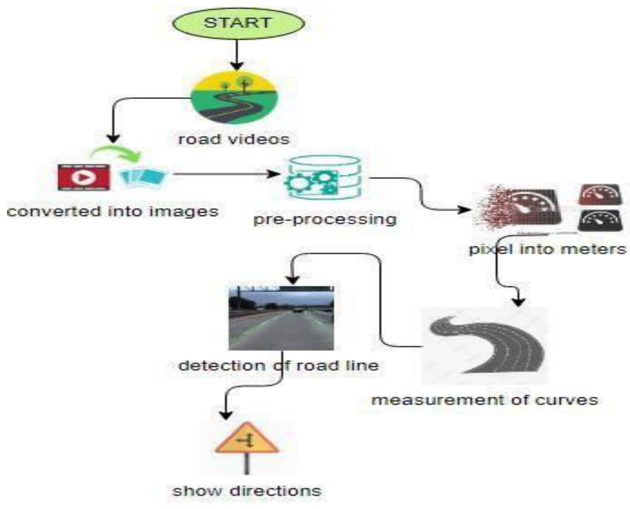

Fig.1: Design Architecture

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Working of Architecture:
We may deduce from the block diagram that we are treating input like road footage. Also, we are turning the videos into many photos. We are pre-processing the data to identify the lane lines after converting it to pictures.
Following pre-processing, we will convert picture pixels into metres and then determine how long the curves should be. It is simpler to identify lane lines by computing the pixels and curves measurement. Finally, it will identify the lane markings, communicate their direction to autonomous vehicles, and detect the lane markings.

IV. METHODOLOGY

1. Uploading a Video:
To convert a movie into photos, we must upload it first. Drag and drop the mp4 file to access it or click the upload option to choose it for the video upload. Instead, by pasting the URL address into the text field, we may import a video from YouTube and turn it into photos. For instance, I inserted the URL link for a YouTube video from a buddy into the box..

2. Converting a video into images:
The proposed video would consist of a collection of still images that would play one after the other. Sometimes taking screenshots will allow us to quickly turn those films into images.

3.Pre-Processing:

A. Perspective Transformation:

A frontal view image may be converted to a top view image and vice versa using the Perspective Converter. Road Lane Lines are often in front of the vehicle. Hence, choosing a zone of interest before the automobile delivers better results than taking into account the entire image when determining lanes. Hence, before the automobile, we may choose a location of interest where the lane markings are apparent. Now we change the perspective of this area of interest from frontal to top. The likelihood of lane lines being visible in a top view photograph is higher than it is in a frontal image. Using this modified top view image, we can now do further pre-processing techniques for lane recognition. Prior to using various pre-processing techniques and lane recognition on this picture, the frontal image is first turned into a top view image. Finally, the top view picture is changed back to the frontal image.

B. Thresholding:

Thresholding highlights the sections of the image that are of interest to us while excluding the uninteresting areas. It does this by converting the image to a binary format, where each pixel is either converted to 0 or 255, with 0 being white and 255 denoting black. The picture is changed to a single channel image. All of the pixels that are relevant to us are turned white, while the others are turned black. Then, we use cv2 techniques to transform the input RGB image into HSV and HSL images. We use the H channel, apply thresholding, and turn off all of the picture's left-side pixels to locate the right lane. This only leaves the right side of the image with white pixels where we want them. We use both the S and L channels for the left lane, perform thresholding, and then set all of the image's right-side pixels to 0. Lastly, we combine the pictures from the left and right lanes into one image, choosing the highest pixel value possible for each pixel in the combined image. We ultimately obtain the thresholded image with the left and right lane sections by doing this.

C. Pixels to Meters Converter:

The International System of Units (SI), sometimes known as measurement units, offers a standard format for measuring an object's physical characteristics. Geographical measurements are used in numerous contexts, including knowledge and industry. The units play a significant role in our daily life, whether it be in grocery shopping or cooking. Using repeating conversion functions, the website Unitsconverters.com aids in the conversion of various scale units, such as Pixel to m. As terrain changes, you need a precise and user-friendly Pixels to Meters converter. Converting Pixels to Meter is a two-step process that requires first choosing the units, then the data that you wish to convert. You must convert the tool if you run into any problems. It offers an accurate unit conversion. There will be a table that lists all the conversions and a method for converting pixels to metres.

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D.Histogram Peak Detection:

Sliding Window Algorithm will be used in this detection to help us identify our lanes. But before putting the method into practise, we must be certain to choose the most appropriate beginning point. If there are pixels in the input region, it works more correctly, but how do we find these pixels in the first place? It's really easy! We shall take into account an image histogram in relation to the X axis. Also, the histogram displays the number of pixels in each column for a picture in each segment. The tallest peaks on both sides of the photograph will then be taken into account.

V. IMPLEMENTATION

When the pipeline is unclear of where the route is, it does a window search to help you identify the routes for the first time. A sliding window search of the image's lower portion yields the histogram, which identifies the starting point of the lines. Next, we'll divide our image into 9 horizontal clips, slide the window into each one, and find the locations with the highest density..

Place an order 2 to locate the correct bend in the line after this has been discovered on both the left and right lanes. Then, for later usage, I added this data to the Line () class. Statistics-wise, window search might be pricey. We shall do a genetic search to free up time for the next frames. Only solid edges found close to the defined route line are sought for.

VI. RESULT SCREENS

Fig.2: Input Page

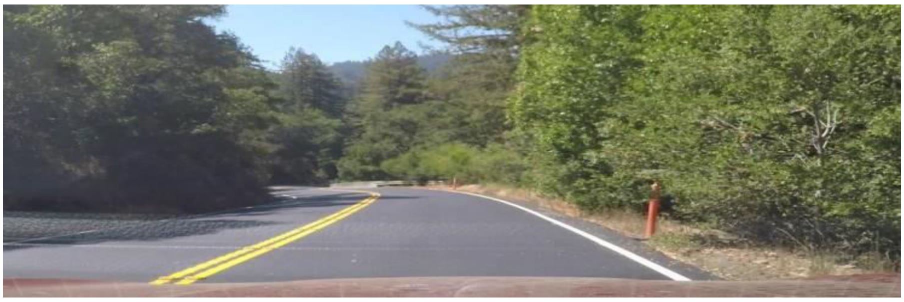

Fig.3 Video Splitting into Images

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Fig.4: Frontal to top view perspective transformation

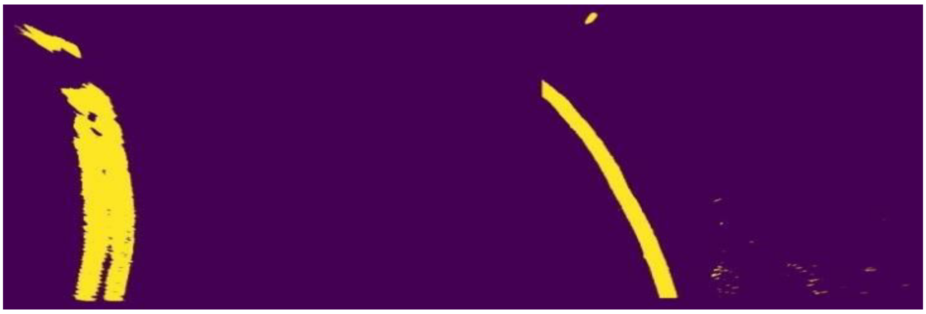

Fig.5: Threshold Method

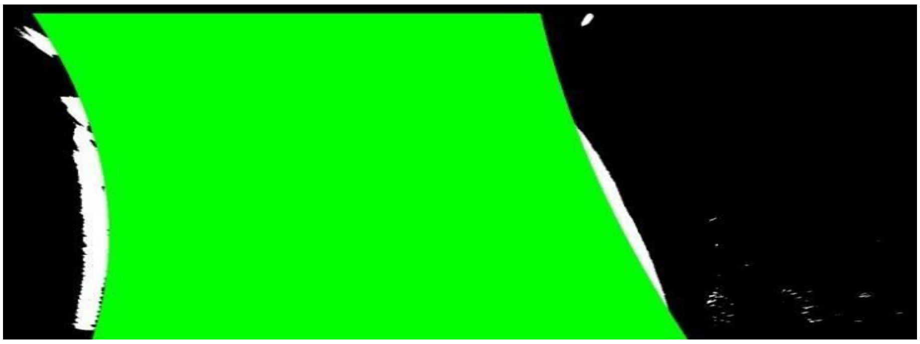

Fig.6: Detecting the lane lines and in between area using sliding window

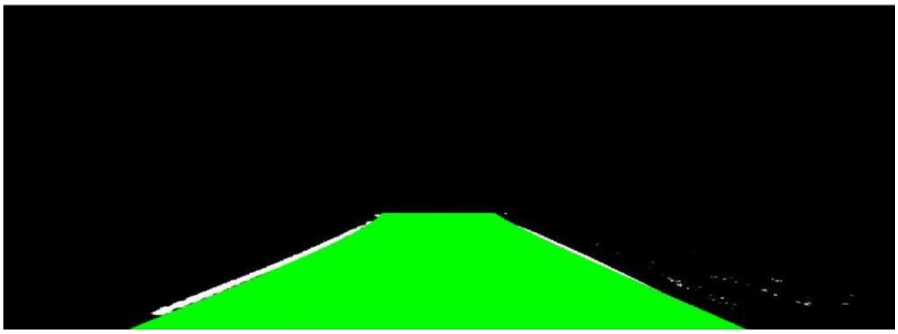

Fig.7: Converting top view to frontal image

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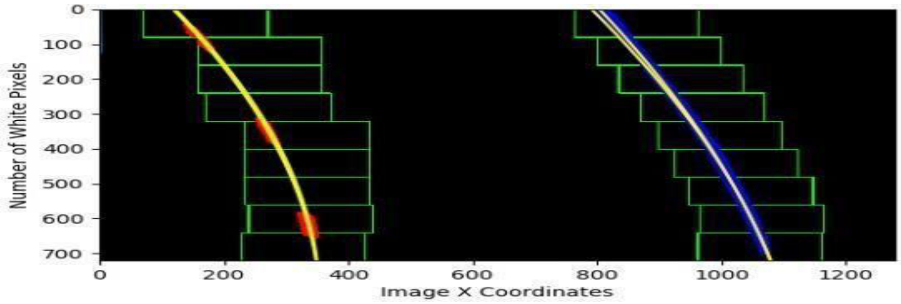

Fig.8: Plot Graph

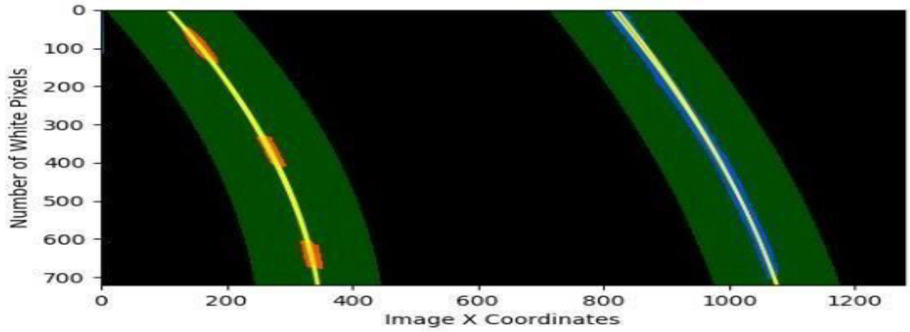

Fig.9: Plot Graph

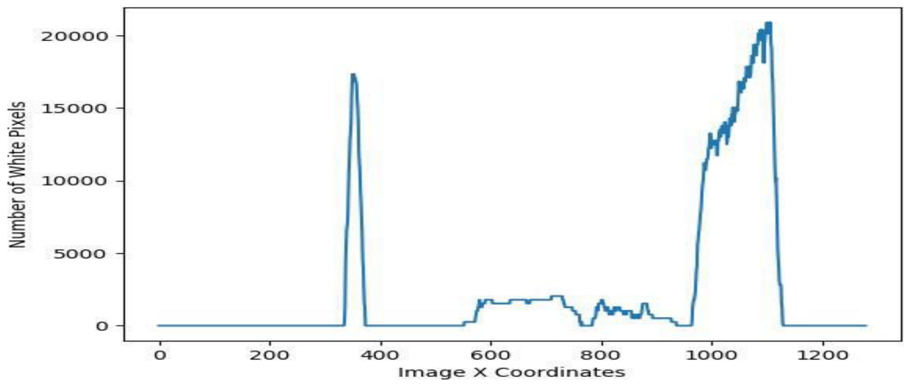

Fig.10: Histogram Plot Graph

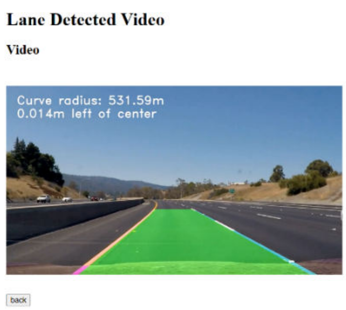

Fig.11:Final Output

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VII. CONCLUSION & FUTURE SCOPE

We have successfully detected the lane line using road videos in this project's conclusion. Here, we have transformed road movies into pictures so that we can easily recognise lane line with the aid of OpenCV. Here, using the curve detection transfer learning approach, we have taken into account the collection of road footage, which will be of various sorts and are transformed into pixels. Then, by submitting road footage, we identify the road line. In this way, the thesis describes the patterns, threads, and steps of the sliding window technique that was used to identify lane lines.
A flexible learning technique is offered as a backup method for getting data from expert software. A number of additional sub-tasks must be completed as well as the algorithm's functionality when using deep learning methods. It is crucial to assist specialists in fitting a certain algorithm and then assess the algorithm's output.Pre-processing and postprocessing are common names for these processes. Upcoming research explores issues with using a text-segregation algorithm. introducing a model workstation created to offer an integrated strategy for the use of text separation.

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