International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3161-3165 www.ijaem.net ISSN: 2395-5252

A Deep Learning Application for Wrong Route Vehicle Detection Using Hough Transform and Lucas Kanade Algorithms

Mr. B. Ajayram(M.Tech)[1], G.S.Karthik[2],G.V.U.Mahesh[3], D.Bhavya[4], G.L.K.Mohan[5]

Assistant Professor[1], LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY,A.P.,India.
Student[2,3,4,5],B.Tech(CSE),LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY.

Submitted: 10-07-2021 Revised: 23-07-2021 Accepted: 26-07-2021

ABSTRACT—
Studies have shown that installing wrong-way vehicle detection systems can help turn more than 67% of drivers around before they enter the freeway. The software can easily detect any vehicle if that particular vehicle traveling in the wrong direction. If the rule is not followed properly, an alarm will be generated at the nearest junction. If the particular traveller travels in the wrong direction beyond the limit, then the system detects by using a vehicle number and sends a message(E-mail) to that particular vehicular. All these things are happening by taking a recorded video, we can extract frames from that video and find the traffic divider line position using Hough Transform and then determine the mask of left and right sides of the road using the traffic divider line and apply the Lucas Kanade Optical Flow to determine whether the direction of the vehicle is correct or not. If any traveller travels in the wrong direction beyond the limit, at that time vehicle number is extracted by using the OCR technique with that we can get the vehicular info and furtherly we perform an action on them.

KEYWORDS— Hough Transform ,Lucas Kanade, Optimal Recognition Character.

I. INTRODUCTION

In these days Road accident is a very common issue in a densely populated country. In 2020, there were 3702 roadaccidents leading to 4227 deaths including many children and students. The capacity of the roadway is not sufficient for the growing number of vehicles and thus imbalance is created. The drivers do not follow traffic rules and take advantage of driving in the wrong side in times of red traffic signals. It increases traffic on one side and hampers traffic flow greatly. It also increases the possibility of head-on collision several times. About 355 people die every year due to crashes in wrong-way driving in the United States. This is a common scenario in most of the cities. So, it's essential to prevent drivers from driving on the incorrect side. To ensure it, those who don't follow traffic rules need to find out and strict law should be applied.

Fig: Heavy traffic jam due to wrong-way driving

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3161-3165 www.ijaem.net ISSN: 2395-5252

The system we present here has following stages. In the first stage, every vehicle in the video frame is detected using the Hough Transform and Lucas kanade algorithms.Alaram will be generated at nearest junction if that particular vehicle detects (i.e if the vehicle travels in a wrong direction). The direction of the vehicle is determined by using Hough Transform and detect whether it moves in the wrong direction or not. If the vehicle is on the wrong side, then the system will capture an image of the vehicle. And also alert message is send to that particular vehicle member. So, this creates a less chances for accidents.

II. RELATED WORK

Deep Learning technology is being used in many intelligent traffic monitoring systems. So far, many systems have been developed for wrong-way vehicle detection. The existing methods can be classified into sensor-based and motion pattern-based. Sensor-based methods use a magnetic sensor to detect the direction of vehicles. The earth's magnetic field gets disturbed within the presence of a vehicle and therefore the sensor gives the signal according to the variation of the magnetic field. From the signal, the direction of the vehicle is often detected. But in this system, the magnetic field can be varied for other reasons too. In that case, it won't give a satisfactory result. The motion pattern-based method uses optical flow measurement. The method proposed uses optical flow calculation to detect the direction and compare it with the modeled lane direction. But this method faces a drag thanks to occlusion. enhance optical flow estimation was used and the authors used background subtraction and the Lucas-Kanade method to detect the wrong-way vehicles.

III. EXISTING SYSTEM AND LIMITATIONS

According to the existing process, it is just going to detect a vehicle which is going in Wrong Route.It also alerts with an alarm sound when a vehicle is detected in a wrong route.

But it is unable to store the records of the vehicles which were into the wrong route in the past and it didnot send warning message and fine details to the vehicular.

IV. PROPOSED SYSTEM

In existing process, it is just going to detect a vehicle which is going in Wrong Route.It also alerts with an alarm sound when a vehicle is detected in a wrong route. But it is unable to store the records.

In our project along with detecting the vehicle that goes in the wrong route, we are going to save the data records of the particular vehicles. Also,we are going to save the traveller /Owner information of the detected vehicles. And also we will send an alert to the Vehicular if he drives in a wrongroute.

1. Selecting the target area:

At first we choose the target area in order to record the video. The region should have a reasonable distance if not there will be a problem to track the large vehicles.

2.Extract frames from a video frame:

By using that video, we extract frames from a input video. In our project we extract frames by using OpenCV module in python.

3.Performing edge smoothing and edge detection:

In order to perform Hough transform we should know the lines or edges which exists on an image. To remove a smoothing sharp noise from that image we do edge smoothing before finding the edges.Edge detection was performed by finding the x and y gradient of an image. The threshold after edge detection to remove unnecessary small edge like the edges on a car or a road which isnot useful for Hough transform.

4.Implemention of Hough Transform Algorithm:

Now, perform hough transform on the edge detected image. Then we find the traffic divider line position using Hough transform. And choose 2 frame analysis from extracted frames to find the masks of left and right side of the road using that traffic divider line. Before applying optical flow method, perform Gaussian smoothing on each image because smoothing the images removed any sharp noises and intensities and we get smoothed derivatives finally.

5.Apply Lucas Kanade Algorithm:

Now, Apply Lucas Kanadealgorithm(least squares) in order to detect the vehicle i.e if any vehicle travels in a wrong direction.

Step 1: Apply median filter on u and v

Step 2: Choose the degree with maximum count. If maximum degree less than 0 vehicle is in right direction else vehicle is in wrong direction.

6. Extraction of Vehicle Number:

If the vehicle travels in the wrong direction

we detect the vehicle and then we capture the vehicle number. Now, by using that we get vehicle records and we send a message to that particular traveller (message consists of fine with a due date).

V. ADVANTAGES OF PROPOSED SYSTEM

- It automatically sends an alert message about a vehicle that crossed beyond limits to a nearby police station.

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3161-3165 www.ijaem.net ISSN: 2395-5252

- It automatically generates message regarding fine to the vehicle owner.
- With this atleast few people will follow the rules strictly.
- With this there will be downfall in accident graph definitely

VI. HOUGH TRANSFORM& LUCAS KANADE

The Hough Transform is an algorithm patented by Paul V. C. Hough andwasoriginally invented to acknowledge complex lines in photographs (Hough, 1962). Since itsinception, the algorithm has been modified and enhanced to be able to recognize other shapessuch as circles and quadrilaterals of specific types. so as to know how the HoughTransform algorithm works, it's important to know four concepts: edge image, the HoughSpace and therefore the mapping of edge points onto the Hough Space, an alternate thanks to represent aline, and the way lines are detected. The Hough Space could be a 2D plane that contains a horizontal axisrepresenting the slope and therefore the vertical axis representing the intercept of a line on the stingimage. The edge point produces a line in HoughSpace within the kind of $b=ax_i+y_i$ (Leavers, 1992) within the Hough Transform algorithm, theHough Space is employed to see whether a line exists within the edge image. The Houghtransform may be a feature extraction technique utilized in image analysis, computer vision, anddigital image processing.Using this algorithm,we find the traffic divider line position in the extracted video frame.

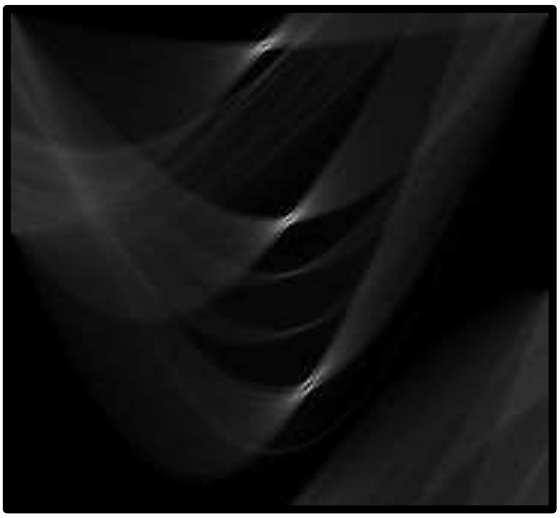

Figure displays Hough Space generated from one of the selected frames

In computer vision, the Lucas–Kanade method could be a widely used differentialmethod for optical flow estimation developed by Bruce D. Lucas and Takeo Kanade. Itassumes that the flow is actually constant in a very localneighbourhood of the pixel underconsideration, and solves the fundamental optical flow equations for all the pixels thereinneighbourhood, by the smallest amount squares criterion. By combining information from several nearby pixels, the Lucas–Kanade method can often resolve the inherentambiguity of the optical flowequation. It's also less sensitive to image noise than point-wise methods.On the opposite hand,since it's a purely local method, it cannot provide flow information within the interior of uniformregions of the image. It works by trying to guess during which direction an object has moved sothat local changes in intensity are often explained. Assume that we watch a scene through asquare hole. The intensity a visual through the outlet is variable. within the next frame the intensityof the pixel has increased to b. It's the instantaneous velocity of the pixel movement of the spatially moving object onthe observation imaging plane. It uses the change of the pixel within the time domain within the imagesequence and therefore the correlation between adjacent frames to search out the existence between the previous frame and therefore the current framecorrespondence, so on calculate the motioninformation of objects between adjacent frames. Generally speaking, optical flow is caused bythe movement of the foreground object itself, the movement of the camera, or the jointmovement of the 2 within the scene. The optical flow algorithm evaluates the deformationbetween two images, and its supposal is that the conservation of voxels and image pixels.It assumes that the colour of an object

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3161-3165 www.ijaem.net ISSN: 2395-5252

doesn't change significantly and significantly within theprevious two frames. supported this concept, we will get the image constraint equation. Differentoptical flow algorithms solve the optical flow problem assuming different additionalconditions. In 1981, Horn and Schunck creatively linked the two- dimensional velocity fieldwith the grey level, introduced the optical flow constraint equation, and obtained the fundamentalalgorithm for optical flow calculation. Assuming that the pixel intensity of the target within theimage doesn't change between consecutive frames and let I(x,y,t) denote the grey value of thepixel at time t ,The assumption of constant brightness is on no account true in point of fact, but it ismore reasonable and natural. As long as Δ t is little enough, this assumption can basically bemet. We perform a first-order Taylor expansion. Since this equation has two unknowns, thereis no unique solution. so as to urge unique solution, new constraints or assumptions must beadded. This algorithm effectively finds the sides of the image which contain the foremostinformation. The Lucas Kanade implementation could keep track of targets throughout affinetransformations and occlusions. Although there are still some improvements to be made tohandle occlusion and maintain stability. Lucas Kanade tracker when the tracker is not any longerable to maintain an honest track on the target. The Lucas Kanade tracker doesn't require aparticle filter. Thefirst mode will take the ultimate output of the Lucas Kanade tracker and use those as inputs to theparticle system measurements. The subsequent frame predicts the constant velocity motion model.Weight each particle supported its distance from the Lucas Kanade targeting output Using thecurrent frame. The Gaussian random distribution for speed base. Resample the particles basedon weight. Lucas Kanade algorithm is used to determine whether the direction of the vehicle is correct or not.

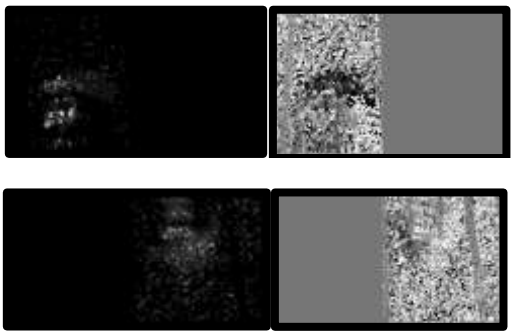

Figure showing applying median filter on u and v to the left side and right side of the road.

OCR, or Optical Character Recognition, could be a process of recognizing text inside images andconverting it into an electronic form.These images may well be of handwritten text,printed textlike documents, receipts, name cards, etc., or perhaps a natural scene photograph.OCR has applications in a very broad range of industries and functions. So, everything fromscanning documents – bank statements, receipts, handwritten documents, coupons, etc., toreading street signs in autonomous vehicles – this all falls under the OCR umbrella.OCR is the technology which extracts alpha numeric characters for vehicle number plate visible in images/videos & live camera streams too.

VII. RESULT

CASE-1:

The figure shows vehicle on the left side of the road is in correct direction and vehicle on the right side of the road is in correct direction.

CASE-2:

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 7 July 2021, pp: 3161-3165 www.ijaem.net ISSN: 2395-5252

The figure shows vehicle on the left side of the road is in wrong direction and vehicle on the right side of the road is in correct direction.

VIII. CONCLUSION

As our country is one of the most populated country in which the deaths rate due to accidents high. So we are came up with an idea to reduce the accidents by implementing thisproject.This is about identifying the vehicles going in wrong direction gives an alaram sound. It generates an automated fine message for vehicle owner which are moving in wrong direction.The two road areas of each frame were sequentially detected to obtain good vehicle detectionresults in the monitoring field. The position of the object in the image was predicted by theLucas Kanade algorithm based on the object detection result. The results verified that theproposed vehicle detection and tracking method for highway surveillance video scenes hasgood performance and practicability. Compared with the traditional method of monitoringvehicle traffic by hardware, the method of this paper is low in cost and high in stability anddoes not require large-scale construction or installation work on existing monitoringequipment.

REFERENCES

[1]. Z. Rahman, A .M .Ami, M.A.Ullah, "A Real-Time Wrong-Way Vehicle Detection Based on YOLO and Centroid Tracking" published IEEE Region 10 Symposium(TENSYMP)

[2]. S.Usman, S.Baydadaev , "Real-Time, Deep Learning Based Wrong Direction Detection" published in Applied sciences2020

[3]. L. W. Tsai, J. W. Hsieh, and K. C. Fan, "Vehicle detection using normalized color and edge map,"IEEE Transactions on Image Processing, vol. 16, no. 3, pp. 850–864,2007.

[4]. X. Wen, L. Shao, W. Fang, and Y. Xue, "Efficient feature selection and classification for vehicle detection,"IEEE Transactions on Circuits and Systems for Video Technology, vol. 25, no. 3, pp. 508–517,2015.

[5]. C. Papageorgiou and T. Poggio, "A trainable system for object detection,"International Journal of Computer Vision, vol. 38, no. 1, pp. 15–33,2000.