International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-5, January 2020

Density Based Emergency Vehicle Detection and Traffic Signal Controlling using Image Processing

Sriharsha Vikruthi, E.V.N.Jyothi, PallamReddy VenkataSubbaReddy

Abstract: ***In present day generation, the number of vehicles is increased because of increase in population. Hence in this paper, the design of vehicle detection and traffic control signal is implemented by using processing of image. The proposed system main intent is to acquire the images for the vehicle and control the traffic signal. Firstly an image is captures from the web camera, which is placed in traffic control area on the road. After this the traffic density is calculated from the obtained images. Basically, this image enhancement performs its operation in two forms they are operating phase and learning phase. Here the captured image as enhanced by using the image enhancement method. Hence the main advantage of this proposes system is that it processes the entire operation in simple way with high speed. The proposed system will capture the images of road areas in effective way. Hence the propose system has various features which will determine the color, width and many other. The proposed implemented system is mat lab software to prevent congestion of heavy traffic.***

Key words: Road detection; Image Enhancement; thresholding; flow estimation; feature selection; traffic density, traffic congestion.

I. INTRODUCTION

The detection and tracking of vehicles has become more important for researchers. Hence the autonomous navigation of vehicle is introduced by the researchers. In the developed countries the autonomous driving vehicles produce lot of problems because of environment conditions [1]. To mark the boundaries of the road, segmentation techniques are introduced. This segmentation technique will maintain the roads and clear the marks in the boundaries. The earlier introduced systems are not valid for the undeveloped areas and rural areas. The main intent of this paper is to focus on the traffic congestion and road detection system. Basically, the information is extracted from the aerial images is difficult task. Instead of that this extracted information is utilized in various applications for monitoring process.

Manuscript published on January 30, 2020.
* Correspondence Author
Sriharsha Vikruthi*, Assistant Professor,Cse Department, Pace Institute Of Technology & Sciences, Ongole, Ap, India-523272 Sriharsha.Vikruthi@Gmail.Com
E.V.N.Jyothi, Associate Professor, Cse Department,Pace Institute Of Technology & Sciences, Ongole, Ap, India-523272 Jyothiendluri@Gmail.Com,
Pallamreddy Venkatasubbareddy, Associate Professor, Cse Department, Pace Institute Of Technology & Sciences, Ongole, Ap, India-523272 P.Venkatasubbareddy@Gmail.Com

Generally, the most challenging concept for ground surfaces with road detection and segmentation [2].Hence various types of image processing technique are introduced. To detect the images which are segmented mainly the analysis of texture is used. The aerial images have best features which represents about the context of the regions.

To detect the road authors introduced a texture based on image processing. By using the photo mosaic generation the images are segmented. These segmented images are collected in a particular form. By using our proposed technique the gaps which are occurred in these images are avoided [3-4]. The flexible solution to avoid the gaps is to introduce the resolution in the system.

Some of the authors implement the design using mixture model of Gaussian, cut graphics and sensor structure. But these designs do not give effective output. Hence in this paper stroke width transformation is introduced. This feature extraction will highlight the features of road information by combining the candidates of road. The regions of the road segmentation also detected by using the feature extraction technique. The extracted regions of road are also detected from the background classes. Up to now the detection of road segmentation is performed. Now, to obtain efficient accuracy and robustness, convolution neural network is used. Hence in this paper, the operation of parallel image processing is done. This gives effective results in terms of speed and accuracy [5].

To obtain the best architecture various types of test are performed based on the system of training. This road structure refined approach will detect and track the images of aerial. The refined structure is based on the convolution neural network. By using the different classes the introduced method will segment the images into number of frames. In real time applications, the segmented image is classified based on the pixel wise classification.

The state of art performance is obtained by recognizing the scenes of road detection. Different parameters are used to detect the road regions but here frequency parameter is used to modify the region of each class. The balancing of class will depend on the pixel number and this is less than the other. By using convolution neural network the weight of each class is maintained in effective way. In the data base, the function of classes is not coherent in nature. The aerial images will compute the frequency by using the combination of median filter response. The below equation shows the enhanced image after detection in terms of frequency approximation.

$$\alpha c = \text{median freq} / \text{freq}(c) \qquad (1)$$

Here the number of pixels in an image which are divided by the number of pixels in class c. The neural network is initialized based on the weights of data base. Hence the images are segmented by configuring the network based on the layer of convolution.

From below sections the discussion and overview of image processing is given. After this the earlier introduced literature review is introduced. Next, the architecture of proposed approach is given in detail manner. At last results are discussed in effective way. Hence the proposed structure will give effective results compared to other systems.

II. RELATED WORK

Now a days, the smallest models of phones has digital camera that smallest mobiles are commonly used for taking images in everyday life. Since for digital photography internal memory capacity have been restricted.

It is extremely necessary to post-process images using software instruments to enhance the quality of the image obtained. Two primary focus areas for researchers are improvement and brightness conservation especially in the field of consumer electronics goods. For low luminance image enhancement can be used, it enhances image appearance and details.

Image enhancement can be two types

(i) Transform domain
(ii) Spatial domain. Transform domain is operating on an image's frequency transformation, such as contrast improvement. On the image's pixel level spatial domain operates directly.

Image enhancement can be used for contrast improvement at various applications because of its simple function, simplicity of application and efficiency. Examples are processing of medical images and processing of radar signals. To flatten the distribution of probability and stretch the dynamic range of gray levels, histogram equalization is used. So that image contrast can be improved. The image's Cumulative Density Function (CDF) used by histogram equalization to map the initial image's gray levels to the improved images. For consumer electronics, for example TVs, cameras etc., Histogram Equalization is not appropriate because the mean brightness of the image, the center point of the gray level range can be alter, it generates irritating artifacts and saturation effect of intensity. Different techniques to solve the above-mentioned shortcomings have been suggested in the literature. But improvement is still needed more attention for low illumination images.

A novel image contrast improvement technique which is called as Sub-Image Histogram Equalization which is based on illumination, suggest in this paper. For low illumination gray scale images it is very efficient and maintains entropy along with control of the improvement rate. The Sub-Image Histogram Equalization method will not only attain the goal of maximizing entropy, but also provide the managed improvement. To get a better strategy for enhanced low illuminated images should be in the suggested method.

Thresholding methods are used for image segmentation and this plays an important role in the system. The intensity of image is divided into number of pixel. The thresholding method mainly used to contrast the object from background. Compared to other objects, background will be lighter. Based on the prior knowledge the selection is made. Basically, the thresholding method divided into three types they are

a) Global Thresholding,
b) Variable Thresholding,
c) Multiple Thresholding

The advantages of thresholding method is given as

- Implementation is simple
- Operation is faster compared to others
- For some kind of images performance is good.

a) Edge Based Methods

In image processing applications the edge detection method is most widely used. In this the regions are depend on the boundaries and calculates the area effectively. Here the edges are identified depend on the detected area. Here enclosing region boundaries are used to separate the rest of image. The edge detection technique will determine the boundaries of edges between two objects.

b) Region Based Methods

Compared to other methods region based method is very effective and also noise is mostly reduced in this section. Depend on the pre defined criteria that image is divided into number of regions. The region based segmentation is mainly divided into three types they are given as region growing, region splitting and region merging.

c) Clustering Based Methods

Dependent on shading highlights with K-means clustering unsupervised calculation novel image segmentation is shown. In this any preparation information didn't utilized. In two phases the whole work is isolated. First upgrade of shading partition of satellite image utilizing de relationship extending is conveyed and afterward the regions are gathered into a lot of five classes utilizing K-means grouping calculation. Utilizing two-stage process, it is conceivable to lessen the calculation overheads managing a strategic distance from highlight figuring for every pixel in the image.

III. LITERATURE REVIEW

The main issue in this entire world is traffic congestion obtained on the roads and signals. In India there is no efficient control system to control the traffic by using traffic signals. But few of the members developed the traffic control system using microcontroller and some other developed the traffic control system using embedded system. Wireless Sensor Networks Fuzzy Logic: This system will determine the direction of vehicle. The monitoring system will collect the information based on the response obtained. The main dis-advantage of the system is there is no weather information available in this system.
From the thorough audit of related work and distributed writing it is seen that numerous scientists have planned various procedures. H.

Chung-Lin and L. Wen-Chieh, presents another way to deal with recognizing the attention video-based utilizations frameworks supervision is the reconnaissance of traffic.
In these lines, the Vision-Based travel through for a long time in the Transportation System, Intelligent (ITS), arranging of transportation and the applications of traffic building to separate investigation of traffic picture, traffic data of exact and stream controlling traffic like checking of vehicle, direction of vehicles, following of vehicle, streaming of vehicle, ordering of vehicle, traffic thickness, speed of vehicle, path changes of traffic, tag acknowledgment, and etc. Before, the vehicle discovery, division and following frameworks are decided to charge the different vehicles for various activities and the toll demand framework.

N. K. Kanhere, et and S. T. Birch field, et al presented a Real-Time Incremental Segmentation and Tracking of Vehicles at Low Camera Angles Using Stable Features," Intelligent Transportation Systems. "Vision-based location, following and order of vehicles utilizing stable highlights with programmed camera adjustment, additionally related work on "Vehicle type characterization from visual-based measurement estimation," in Intelligent Transportation Systems. The Intelligent Transportation System (ITS) gives administrations identified with various methods of move and traffic the executives frameworks with a combination of traffic control focuses. Video-Based examination for traffic reconnaissance has been a fundamental piece of ITS. The traffic reconnaissance in urban condition have become all the more testing contrasted with the thruways because of different components like camera arrangement, jumbled foundation, present variety, object impediment and light changes. This paper gives survey on video-based vehicle observation for discovery, following and conduct investigation with efficient depiction. In this overview we characterize the dynamic qualities of vehicle regarding vehicle movement and appearance attributes, including speed, heading of development, vehicle directions on a solitary camera.

IV. VEHICLE DETECTION AND TRAFFIC SIGNAL CONTROLLING SYSTEM

The below figure (1) shows the block diagram of proposed system. In this system pre-processing technique, convert to gray scale, flow estimation, feature selection, image enhancement, thresholding recognition processes are used. Here first camera will capture the image and first pre-processing technique will be applied. Here the pre-processing technique is known as normalization process. This normalization will change the pixel range in terms of values. After the values are changed, it will be converted into gray scale images. The converted image is estimated based on the obtained flow. From this image the features are selected and image will be enhanced. Hence the image is converted from gray scale to binary image by thresholding process. Now the traffic signal is detected and output is obtained.

The below shows the algorithm of vehicle detection and traffic control system:

1. The program will be started
2. The blank road image will be captured for reference module by connecting the camera
3. The images should be Capture with vehicles
4. The color of the images are converted from red, green, blue, to grey
5. The value of magnitude can be found by using thresholding principle.
6. The threshold difference can be measured by using frames
7. The vehicles number should be determined
8. The image of the output will be displayed
9. The vehicles counting will be displayed.
10. The green light will be allotted for different timings and the number of vehicles will be counted and displayed by the seven segments.

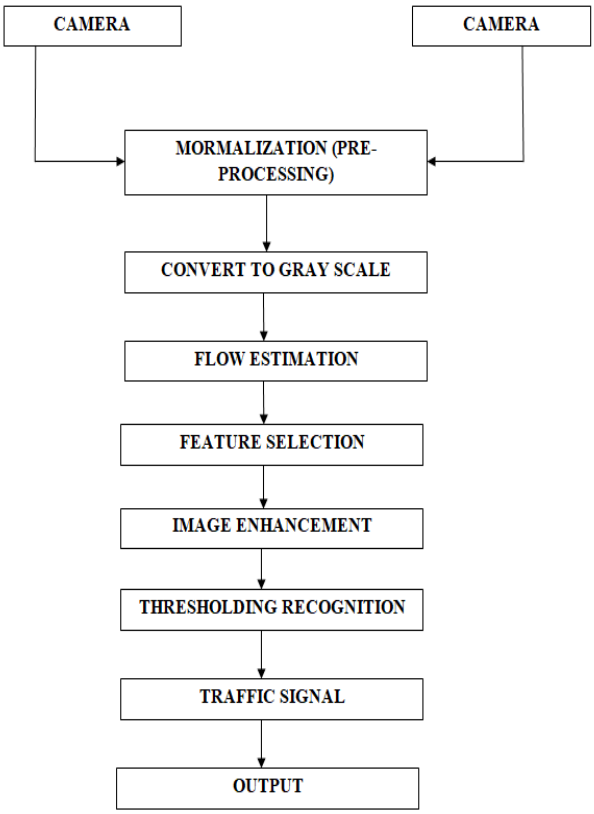

Fig. 1: PROPOSED SYSTEM

Now, the features will detected by using the feature extraction technique. Here the feature will be detected and extracted in effective way. Hence this system will minimize the error in effective way.

The main intent of image enhancement is to convert the obtained image into gray image. This converted image will be contrasted to a certain threshold level. This contrasted image will be based on the conversion of binary. Hence this process is known as image enhancement process.

After this process image thresholding process is performed. Now image is divided into the foreground and background. Hence the gray scale images will be converted into binary images. Now the signals will be detected by using the red, blue and green signals. Hence the effective output is obtained by using proposed system.

V. RESULTS

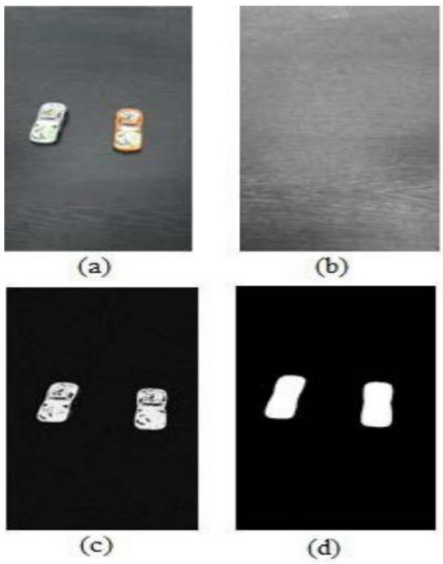

Fig. 2: Implementation Results (A) Captured Image (B) Background Image Used As A Reference (C) Foreground Image (D) Foreground Image After Enhancement Techniques

The above figure (2) shows the implementation results. Here first a capture image is shown and next the background of image is detected. After this foreground image is shown and fore ground image after applying enhancement technique is shown.

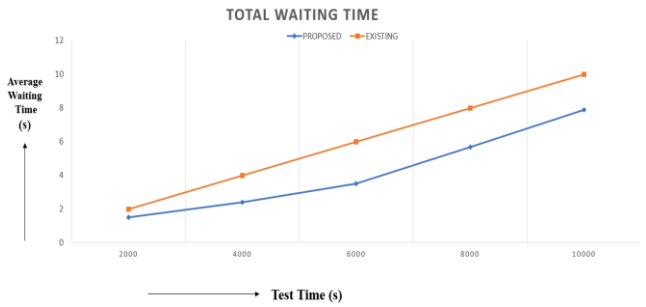

Fig. 3: TOTAL WAITING TIME

The above figure (3) shows the comparison of total waiting time for propose system and existing system. Compared to existing system, the proposed system gives effective results.

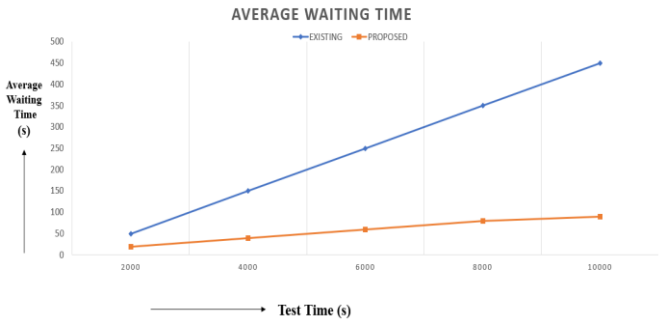

Fig. 4: AVERAGE WAITING TIME

The above figure (4) shows the comparison of average waiting time for proposed system and existing system

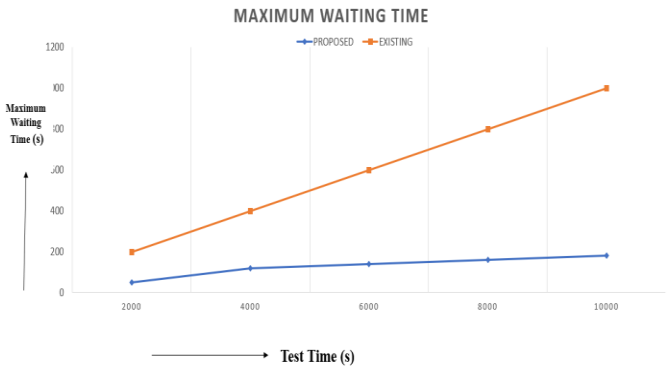

Fig. 5: MAXIMUM WAITING TIME

The above figure (5) shows the comparison of maximum waiting time for proposed system and existing system.

VI. CONCLUSION

The architecture of road detection and traffic control system is implemented. In the entire system thresholding and image enhancement plays important role. The main intent of this paper is to detect and enhance the road images without any distractions. The road areas are propagated by using the feature based extraction. Effective results are obtained with high accuracy for the proposed system. By using the properties of distinctive geometry and radiometry in image processing, the features are extracted effectively. Hence the proposed system will detect and control the traffic road regions which are shown from the simulation results.

REFERENCES

1. Gun deep Kauri, Sonia Sharma," Traffic Management Using Digital Image Processing", IJCST Vol. 8, Issue 2, April - June2017.
2. Vishay Pandit, Jinesh Dashy, Dhruv Mehta, Ashay Mhatre and Abhilash Janardhan, "Smart Traffic Control System Using Image Processing", International Journal of Emerging Trends & Technology in Computer Science (IJETTCS), Vol 3, Issue 1, January – February2014.
3. Anil Vishwasrao, Omkar Ramdas Gaikwad, Prof. Kanchan Pujari, Tejas Talathi, "Image Processing Based Traffic Light Control", International Journal of Science, Engineering and Technology Research (IJSETR) Vol 3, Issue 4, April2014.
4. Md. Munir Hasan, Aminul Hoque, Gobinda Saha, and Md. Badruddoja Majumder. "Smart Traffic Control System with Application of Image Processing Techniques", 3rd International Conference on Informatics, Electronics & Vision2014.
5. Chandrasekhar. M, Saikrishna. C, Chakradhar. B, Phaneendra Kumar. P & Sasank. C. "Traffic Control Using Digital I Image Processing", IJAEEE, ISSN (Print): 2278-8948, Vol-2, Issue-5, 2013.
6. Postman Niksaz, Science &Research Branch, Azad University of Yazd, Iran, "Automatic Traffic Estimation Using Image Processing ",2012 International Conference on Image, Vision and Computing.
7. Varaprasad G., Wahidabanu R.S.D., "Flexible Routing Algorithm for Vehicular Area Networks", in Proc. IEEE Conference on Intelligent Transport Systems Telecommunications, Osaka, Japan, pp.30-38, 2010.
8. Gokulan B.P., Srinivasan D., "Distributed Geometric Fuzzy Multi-agent Urban Traffic Signal Control", IEEE Transactions on Intelligent Transportation Systems, vol.11, no.3, pp.714-727, 2010.
9. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing, 3 rd ed. 2008.
10. K.M.M. Rao, "Overview of Image Processing", Proceedings of a workshop on image processing and pattern recognition, IETE, Hyderabad,25- 26 September2004.

AUTHOR'S PROFILES

Sriharsha Vikruthi, working as an Assistant Professor in CSE Dept. of Pace Institute of Technology & Sciences. Currently pursuing Ph.D in CSE Department at Annamalai University. I have 10 years of experience in teaching for various Professional Institutions across India. So far I have published 12 papers in various Journals & Conferences.

E.V.N.Jyothi, working as an Assoc.Prof. in CSE Dept. of Pace Institute of Technology & Sciences. I did M.Tech in CSE and currently doing Ph.D in CSE Department from Shri Jagdishprasad Jhabarmal Tibrewala University. I have 14 years of experience in teaching for various Professional Institutions across India. So far I have published 20 papers in various Journals & Conferences.

P.Venkata SubbaReddy, Working as an Associate Professor in CSE Department of PACE Institute of Technology & Sciences, ONGOLE,A.P,INDIA. He Has 17 Years of Teaching Experience. He Has published more than 22 papers in has published 21 papers in Various International, National Journals and Expert in Paper Evaluation.