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AUTOMATED TRAFFIC MANAGEMENT SYSTEM USING IMAGE PROCESSING

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Abstract:

Nowadays Intelligent system is playing the crucial role in traffic surveillance and monitoring for each and every urban city in the worldwide. Currentinvoluntary traffic surveillance schemes are usually known to include costly equipments with complex operation procedures. In this paper we propose a strong traffic surveillance system which reuses the existing roadside cameras to capture traffic scenes, automatically examine the traffic and helps in controlling the traffic. The image sequence analyzed using digital imageprocessing, The edge detection technique is used for vehicle detection, and according to traffic conditions on the road traffic light can be controlled.

Keywords: Image processing, edge-detection, traffic management, traffic density, traffic controller.

I. Introduction

As the population of the modern cities is increasing day by day due to which vehicular travel is increasing which lead to congestion problem. Traffic congestion has been causing many critical problems and challenges in the major and most populated cities. The increased traffic has led to more waiting times and fuel wastages. Due to these congestion problems, people lose time, miss opportunities, and get frustrated. Automated traffic detection scheme is compulsory for smooth and safe running of the civilization, which will lead us in the direction of proper investigation of traffic, scattering of monitoring signals and alteration of control management. There are a number of machineries that are being used to sense the congestion of traffic. This paper deliberates a feature based tracking system, which detects vehicles under challenging circumstances. The use of image processing in traffic management that camera isalways monitoring the traffic by capturing the images and the videos. At specific intervals of time the frames are removed and successive frames are associated and based on designated. The results from thiscan be used for growth of an android application, which will be easy, and near for the user in helping those to choice the route to their destination by saving the time, which may have, spend on searching through busy streets.

II. Literature Survey

In [3] suggests that the analysis can be improved with the use of multiple sequential cameras alongside a highway which along with

containedcongestion control, examines the congestion build up from the start to the end point.

In [4]In this work author shows the analysis and comparison of numerous contour tracing and object counting approachesincidental that the Moore neighborhood method is best likened to the other approaches. The paper shows that image processing is an efficient method of traffic control technique.

[10] Author presents the image processing for reducing the traffic congestion and avoids the consumption of time through a green light on an empty road. It is furtherprecise in detecting vehicle occurrence because of the use of real traffic images. The scheme is good but developments need to be made in order to achieve a hundred percent accuracy.

In [5] this paper presents the comparison of numerous edge detection procedures result that Canny Edge Detector method is the most effectual algorithm. The web cams take images, then, experience a series of steps connected to Image Processing and Image Analysis. Lastly, they calculate the traffic volume and drive the traffic light's timer consequently. The system helps in minimization of numerous factors like waiting time, fuel consumption and congestion.

III. Existing Methods Used For Traffic Management

1. Manual Controlling-

In this method simple and basic tactic is to employ a person at significantparts to control traffic according to different countries and states. The traffic controls possess signboard, sign light and whistle to control the traffic. In instruction to control the traffic they wear specific uniforms. But as the quantity of traffic is so increasing that police persons have to face many problems in regulatory the traffic manually and escapes frauds done by people.

2. Automatic Controlling

Timers and electrical sensors do automatic controlling of traffic light/signals. A constant arithmetical value is loaded in the timer for every phase. Depending on the changes in timer values, the light mechanically gets OFF and ON. The obtainability of the vehicle and signals on each phase are captured through the sensors and depending on the signal the lights mechanicallygets switch ON and OFF. This gets slightly helps to control heavy traffic based on timing attributes.

3. Magnetic Loop Detectors (MLD)

Magnetic loop sensors are use to count the quantity of vehicles on the road using magnetic properties. The Present traffic management methods like magnetic loop detectors which are buried in the road, radar and infrared sensors on the side of roads deliver limited traffic information. Itdisplays the obligation of distinctschemes for correct counting of traffic and precisemanagement.

4. Inductive loop detectors

This techniquedelivers a cost-effective solution for traffic controlling but beside with this it is also true that their failure rate is high when they are connected in poor highwayplanes, foremost to fall in pavement life. At the time of preservation and repair it obstructs the traffic.

5. Use of light beams-

Light beams similarultraviolet rays, LASER etc can also be used for regulatoryoperative of

traffic. But, in this technique the light beams are congested as traffic movements causing incorrect results.

6. Use of image processing

To meet the precisenecessitiesoneautomaticschemerequiresc ommunication with the computer. Traffic jam can be simply detected by human eyes. The human brain comes within a second with a decision of whether a jam has happened or not by processing the image, detecting and examining objects. Computers can only process binary data. The picture on the road is really a binary data, which needs to be signified as a digital image. It is used as a main input. The image when captured is unformatted and raw. For the effectual processing computer operator need to procedure that raw image and excerpt useful information from them. Numerous fields like image processing object recognition, computer vision, etc. have emerged due to need of extracting information from images.

IV. Processing of digital Images

Following are the steps involved in work

1. Image acquisition
2. RGB to gray conversion
3. Image enhancement
4. Image matching using edge detectionProcedure

Stage 1

- Firstly image acquisition is done with the help of web camera
- 1st image of the road is took, when there is no traffic on the road
- This unfilled road's image is saved as orientation image at a specificpositiondefinite in the program
- RGB to gray adaptation is done on the reference image
- Currently gamma correction is done on the reference gray image to attain image enhancement
- Edge detection of this position image is done afterward with the help of Prewitt edge detectionoperator

Stage 2

- Images of the road are captured.
- RGB to gray conversion is done on the sequence of captured images
- Now gamma correction is done on every of the captured gray image to achieve image enhancement
- Edge detection of these real time images of the road is currently done with the help of Canny edgedetection operator

Stage 3

- When edge detection process both reference and real time images are coordinated and trafficlights be measured based on fraction of matching.
- If the matching is among 0 to 10% - green light is on for 90 seconds. If the matching is among 10 to50% - green light is on for 60 seconds. If the corresponding is between 50 to 70% - green light is on for 30seconds. If the corresponding is among 70 to 90% - green light is on for 20 seconds. If the matching isbetween 90 to 100% - red light is on for 60 seconds.

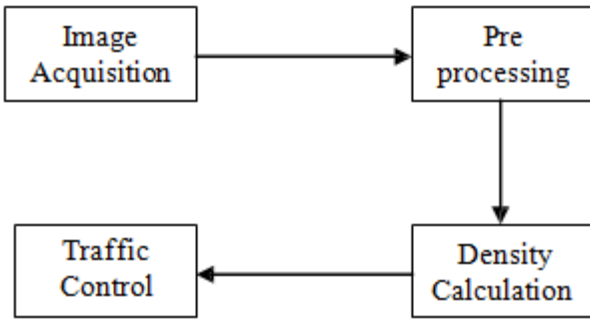

Figure 1: Basic architecture of system fortraffic density calculation

CANNY EDGE DETECTION

1. Canny labeled anextensively used edge detecting procedure which is best to stage edges corrupted through noise. The cannyedge detection procedure was proposed to improve the edge detection process.
2. Three important criteria were occupied intodeliberation for this determination. The first and most important standard was to detect all the important edges in the sourceimage. This means the goal was to lower the error rate.
3. The second criterion was that the edge points to be detected asclose as possible to the true edge, also called as localization. A third criterion was not to have more than one responseto a single edge. The Canny edge detector was thus implemented on these criteria.
4. It first smooths the image toeliminate noise. Then the image gradients are designed to point out those areas where the gradient alteration isextreme, which have high three-dimensional differences. Lastly, it then waysbeside these regions and rejectssome pixel thatweakly describes an edge (non- maxima suppression) in instruction to create the edges thinner.
5. To promotedecrease the gradientarray, it achieves hysteresis which tracks beside the continuing pixels that have minimum gray level values but have notbeen suppressed. The Smoothing perception has beenfunctional in this Gaussian process, so the outcome of errors is actual through using the probability. The next benefit is successful the signal with respect to the noise ratio and this is recognized by Nonmaxima overthrow technique as it results in one pixel wide ridges as the output. The third advantage is improved detection of edges especially in noise state with the help of thresholding technique.
6. The most powerful edge detector is the canny edge detector provided by the function **edge**. The Canny edge detector incorporates information about the direction of the image gradient in determining whether a given pixel is an edge pixel. It also has two thresholds, a weak threshold T_1 and a strong threshold $T_2 > T_1$.
7. Pixels above the weak threshold count as an edge only if there are pixels above the strong threshold adjacent to them. The Canny edge detector gives good edge detection for biological images, which are typically noisy and have less well-defined edges.

BW = edge(I,'canny',THRESH, SIGMA)

Where **THRES** is a two element vector in which the first element is the low threshold, and the second element is the high threshold. **SIGMA** is the standard deviation of a Gaussian filter that is applied to the image prior to edge detection. Try applying the canny edge detector the microtubule image, and play around different values of the threshold and smoothing. Edge

detection can be used in conjunction with hole filling (imfill) to recognize and segment objects with well-defined boundaries.

V. RESULT and DISCUSSION

To compare between various types of edge detection algorithms we tested their performance for ten images taken from real traffic intersections. After finding the edges, the picture was subjected to an object counting algorithm. The performance of the edge detector algorithms was defined by the number of vehicles accurately detected.

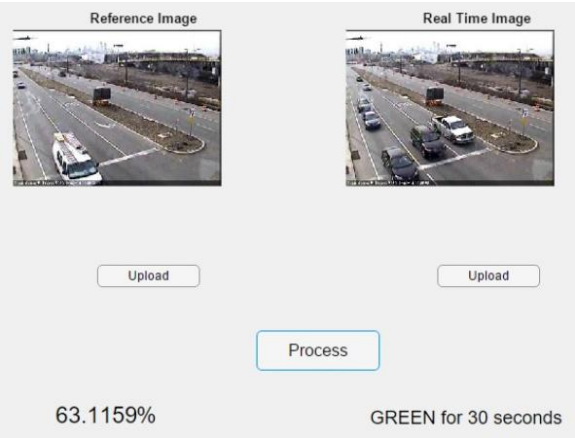

Figure 2: Input image and Reference image

In image 2 we have done image acquisition, In this First image of the road is captured, when there is no traffic on the road. This empty road's image is saved as reference image at a particular site specified in the program.

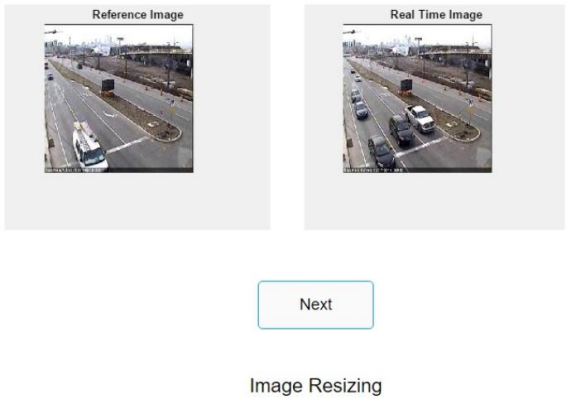

Figure 3:Image resizing of input image and reference image

Above figure shows the image resizing of image. Image resizing is necessary when we need to increase or decrease the total number of pixels, whereas remapping can occur when weare correcting for lens distortion or rotating an image.

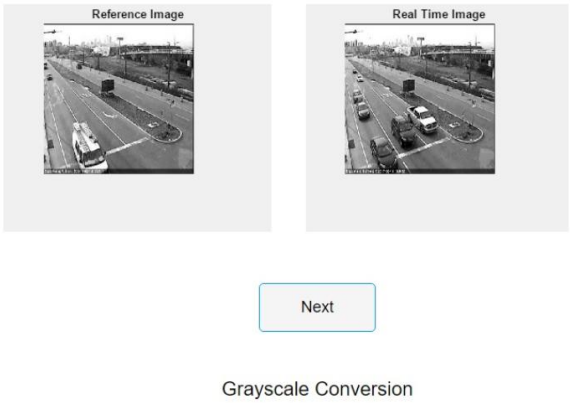

Figure 4: Gray scale conversion process

Figure 4 shows the Gray scale conversion from

RGB to Gray, RGB to gray conversion is done on the progression of captured images. When gamma correction is done on each of the captured gray image to achieve image enhancement.

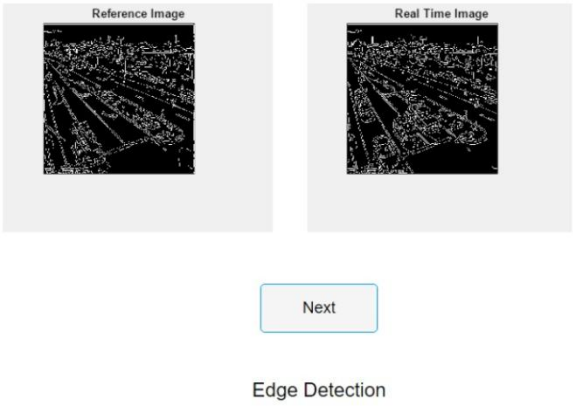

Figure 5: Edge detection of Traffic using canny technique

The method of thresholding used by the Canny Edge Detector is referred to as "hysteresis". It makes use of both a high threshold and a low threshold. If a pixel has a value above the high threshold, it is set as an edge pixel. If a pixel has a value above the low threshold and is the neighbor of an edge pixel, it is set as an edge pixel as well. If a pixel has a value above the low threshold but is not the neighbor of an edge pixel, it is not set as an edge pixel.

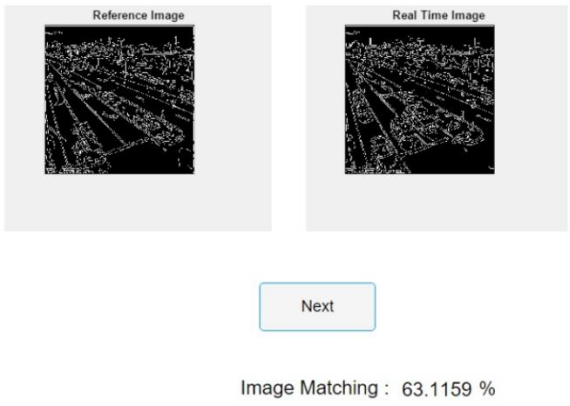

Figure 6: Output of image matching

Image matching done using edge detection methods which locate the pixels in the image that correspond to the edges.

VI. Conclusion

In this research, we have effectivelyfulfilled an algorithm for a real-time image processing based traffic controller. Upon comparison of numerous edge detection algorithms, it was contingent that Canny Edge Detector method is the well-organized one. The paper demonstrates that image processing is a far more efficient method of traffic control as compared to traditional techniques. We achieve 63.11% matching rate using canny edge detection. The use of our algorithm removes the need for extra hardware such as sound sensors or RFID tags. The increased response time for these vehicles is crucial for the prevention of loss of life.

In addition, we would like to propose a system to identify the vehicles as they pass by, giving preference to emergency vehicles and assisting in surveillance on a large scale.

REFERENCES

[1] Pushpendra Kumar, RochdiMerzouki"Modelling of Traffic Dynamics", IEEE transaction on INTELLIGENT TRANSPORTATION SYSTEMS, June 2014, pp.653-792.

[2] Nidhi D. Agrawaa1, AmitSahu, "Intelligent Real Time Traffic Controller Using Image Processing – A Survey",IJSR journal, Feb 2013.Vol.I,Index(4).

[3] Prof. Uma Nagaraj, JinendraRathod, PrachiPatil, Sayali Thakur, Utsav Sharma / "International Journal of Engineering Research and Applications" (IJERA) ISSN: 2248-9622 Vol. 3, Issue 2, March -April 2013, pp.1087-1091 1087

[4] P.Srinivas, Y.L.Malathilatha, Dr.M.V.N.KPrasad,"Image Processing Edgge Detection Technique used for Traffic Control Problem",International Journal of Computer Science and Information Technologies, Vol4(1),2013,17-20

[5] N.R.Vikram, S.Sivaraman, R.Balamurugan,"Controlling Traffic Jam using Feature Detection and Object Detection Technique",IOSR Journal of Mechanical and Civil Engineering,e-ISSN:2278-1684,p-2320-334XPP 07-13.

[6] PejmanNiksaz, "Automatic Traffic Estimation using Image Processing", International Journal of Signal Processing, Vol.5(4), December 2012,167-174

[7] Kavya P. Walad, JyotiShetty, "Traffic Light Control System using Image Processing", IJIRCCE journal, Vol. 2(5), Oct. 2014, 274-293

[8] ParichitaBasak, RamandeepKaur, "Intelligent Traffuc control System using Image Processing", IJSR journal, Volume 5, Issue 8, Aug. 2016,1396-1398

[9] PrashantJadhav,PratikshaKelker, "Smart Traffic Control System using Image Processing", IRJET journal, Vol. 3, Issue 3, Mar. 2016, 1207-1211

[10] VishmayPandit, JineshDoshi, "Smart Traffic Control System using Image Processing", IJETTCS journal, Vol. 3, Issue 1, Feb 14, 280-283