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Review on Traffic Density Count using Image Processing

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Abstract: ***In today's life we have to face different types of problems one of which is increasing number of vehicles. Due to which it increases traffic and congestion. The solution is to conquer the traffic congestion is the Intelligent Traffic control system. The real time image processing is used to measuring the traffic density on that road. The various research papers are used to sum up an overview on different strategies for building up a Smart Traffic Control System for Traffic Density Count. For Traffic Density Count, it likewise demonstrates an analysis on various strategies under the image processing. Different authors utilized different techniques like identifying number of vehicles from the video utilizing the camera mounted at path and some utilizes live video for Traffic Density count using the image processing and video or utilize remote sensors to detect presence of traffic. This paper shows the comparison and survey of all these methods.***
Keywords: Image Processing, Traffic density count, Traffic congestion, Video Processing.

I. INTRODUCTION

India is a large country and around the world India is second most populous country and one of the fastest-growing economy. In today's life we have to face different kinds of problem one of which is increasing number of vehicles it increases traffic and congestion. Infrastructure growth in India and growth in number of vehicles is not equal, because of large population with spending capacity of number of vehicles as much as faster than infrastructure growth. The quantity of vehicles increases step by step along these lines in order to make better use of the actual road limit, it is imperative to deal with the flow of traffic proficiently. Traffic jams do not affect human routine lives and increase transport costs. The Smart Traffic System is needed to deal with the traffic jam or blockage issue easily. Review of this paper diverse strategies of Smart Traffic control System and Traffic Density Count. Most of the techniques discussed for live Traffic Density Count on the road utilizing Image Processing. Some different methods talked about strategies like utilization of Neural Networks, Sensors, Microcontrollers, Embedded system, Arduinos, Raspberrypi etc. The video is captured by cameras introduced at the traffic intersection to catch live recordings i.e. live video of the street conditions. Frames are caught from those recordings and Image Processing algorithm is utilized to an acquire the Traffic Density Count [1]. Every one of the methods might be divided into four unique parts–

A. Image Acquisition
B. Image Pre-processing
C. Density Count
D. Traffic Control.

In all the methods Image acquisition is same and different density counting algorithms. The method makes utilization of Dilation and Canny Edge Detection of images for distinguishing vehicle edges. Then after that getting the exact number of vehicles by looking at reference images and the real time images [5]. Another method makes use of motion detection and morphological operations like Erosion, Dilation and Hit or Miss [4]. For Density Count, one of the creators propose a calculation by correlation among the reference image and one frame of the live video [1]. Another method makes use of probe vehicle equipped with various sensors. A Radar equipped probe vehicle had multiple sensors at various points. The probe vehicle sense current traffic condition and developed a methodology to estimate traffic density on road [3]. One of the authors propose the algorithm using motion detection and also uses the Embedded platform [2]. Another method makes use of video stream and background subtraction method [6]. The overall paper is organised in such a way: segment II clarifies literature survey of the current advancements for traffic density count. Area III talks about the similar investigation of algorithms and their usage for image processing. Area IV gives the advantages and disadvantages of the algorithms. At last, segment V gives results pursued by the key references utilized in the work.

II. LITERATURE REVIEW

Alisha Janrao, Mudit Gupta, Divya Chandwani, U. A. Joglekar [1] proposed method, the traffic is co-ordinate by maintaining an identification of vehicle density from each side and control the traffic signal along these lines. They determine the density counting technique to decide the number of vehicles on the street. So, the examination between the reference image and one frame of the live video is done for getting traffic density count.

Ashwini D. Bharade, Surabhi S. Gaopande [2] presents a constant traffic observing framework for identify and assess the count of vehicles utilizing movement identification approach for Image processing technique. These ongoing examination presents numerous difficulties in video investigation and in order to reduce computational complexities, the algorithm uses background subtraction strategy. The framework is used to test various video sequences.

Daisik Nam, Riju Lavanya, Inchul Yang, Woo Hoon Jeon, R Jaya krishnan [3] build up another algorithm for traffic density estimation utilizing probe vehicles equipped with different sensors. A radar-prepared probe vehicle has different sensors at different focuses, having the Global Positioning System (GPS), high resolution 77 GHz radars, Cameras, media transmission advances and advanced guide helped frameworks, probe vehicles can detect current traffic conditions. They built up a technique to estimate traffic density of a street by catching the neighborhood densities distinguished by radar-prepared probe vehicles.

Pejman Niksaz [4] proposed a system which uses MATLAB software and Image Processing to estimates method for counting the traffic density. Strategy was completed by utilizing images taken from the streets. Videos captured by camera from the highway are changed to the image sequences. Every one of the images is processed independently. At that point the number of vehicles has been counted. On the off chance that the number of vehicles like van, car or trucks passes a particular threshold and caution on substantial traffic will be shown.

Mohammad Shahab Uddin, Ayon Kumar Das, Md. Abu Taleb [5] the primary contribution of this exploration lies in the advancement of method that recognizes traffic density by vehicle edge area for traffic jam control. Particular methods, morphological tasks and images taken with cameras would be utilized to recognition of traffic density counts.

Osman Ibrahim, Hazem ElGendy, and Ahmed M. ElShafee, [6] they proposed a speed detection camera system (SDCS) is relevant as radar elective. Speed Detection Camera System utilizes few video feed image processing algorithms based on the online captured from solitary camera. It used a hybrid formula dependent on background subtraction approach using three-frame formula.

Hong sheng He, Member, Zhenzhou Shao, and Jindong Tan, [7] proposed strategy to recognizes vehicle models from a single image caught by a camera. Because of different configurations of traffic cameras, the image might be captured in various perspective and lighting conditions and image quality varies in resolution and shading depth. The highlights of vehicle are extracted, standardized, and classified using a gathering of neural-network classifiers. The proposed method is assessed on a data index of practical traffic images.

S. Sri Harsha, Ch. Sandeep [8] present the Vehicle counting is completed by finding the centroid and Background subtraction. In this strategy, the classification is finished by the peak hour, which means that the traffic increases to the most extreme, leading absolutely to street blocks and thresholding techniques. The technique was depending on the image processing hypothesis.

Anurag Kanungo, Ayush Sharma, Chetan Singla [9] proposed the method to utilize live video streaming from cameras at signal of traffic intersections for count of traffic density using processing of image and video. The proposed technique also presents the algorithm for switching lights at traffic as indicated by number of vehicles on the streets, in this manner decreasing traffic jams and congestion on the streets, that will help to reduce the number of road accidents.

Mallikharjuna Rao, Santhi Kiran Bhathula, Pavankumar Yadavalli and Ramarao Kandula [10] the system utilizes new advances for real-time collection, association and transmission which gives the information to estimate the exact traffic density count abused by traffic-aware applications. This paper proposed Internet of Things based methodology that take care of issues raised by traffic Congestion. The system is based on ARDIUNO.

M. Vidhyia, S. Elayaraja, M. Anitha, M. Divya and S. Divya Barathi [11] they try to reduce potential outcomes of traffic jams. In this method, the traffic density count using Blob analysis and Morphological filtering is used. Raspberry-pi is the framework. The system includes an Infrared transmitter and Infrared receiver on both sides of the lane.

J. Naga Phanindra, V. Srinivas [12] presents method for the traffic level before entering the traffic section along with live streaming and updates on WEB page and controls the traffic signals based on the density by using RASPBERRY PI.

Suresh Babu Changalasetty, Ahmed Said Badawy, Wade Ghribi, Haytham Ibrahim Ashwil [13], Method has been proposed to mechanize procedure of the monitoring system for traffic by identifying and classifying moving vehicles on the street. For image processing of vehicle images, the system uses LABVIEW to extract highlights such as perimeter, area, width, length and strategy in

addition to examining the neural network data mining method for the vehicle's demand as large or small. The LABVIEW for the calculation of traffic density is added to the vehicle classification.

A. R. Zade, D. R. Dandekar [14] Presents the Fuzzy Traffic Controlling Simulation design for control the lights such as Green, Red and Yellow light for traffic flow time. This framework gives the signal control of two central parts of traffic -

1) Observation of the current circumstances of the traffic around the crossing.

2) Traffic signals control in accordance with the observed situation.

This module is built in the SIMULINK MATLB environment.

R. Sofia Janet, J. Bagyamani [15] Method for analysing and recognizing vehicles in road traffic images. This system utilizes image processing strategies such as the threshold, background differentiation and morphological filters of Otsu. To calculate the recognized characteristics of the vehicle area and entire work has been developed using MATLAB.

Naeem Abbas, Muhammad Tayyab, M. Tahir Qadri [16] presents an algorithm for determining the exact count of vehicles on the lane of traffic. The algorithm for density count was completed by comparing the live video image in real time with the reference image and the vehicles in the region of interest.

Ravi Patel, Dr. Tejas Shah [18] Image processing is visualized for video image processing which evaluates the traffic density at cross streets and research of real time traffic control has been proposed. The processed information has been utilized to synchronize traffic lights with variable time delays and working execution of a control system has been done in MATLAB tool.

III. COMPARISION BETWEEN ALL IMAGE PROCESSING ALGORITHM

Image processing was a signal processing type for which the image is the information, for example, a video or photo; the image processing output can be either an image or parameters or a large number of image related attributes. More techniques for image processing include a two- dimensional signal as image, the application of signal processing systems. The image of street could be presented as binary data (digital data), but it should be utilized to extract relevant data. This is because the image was raw and unformatted if it is captured from indigenous habitat. Therefore, operations such as image improvement, brighten or darker, edge detection, etc. are used.

The basic design architecture for traffic density count can be illustrated as below, which has following four stages-

1) Image acquisition

2) Image Pre-processing

3) Density count

4) Traffic control

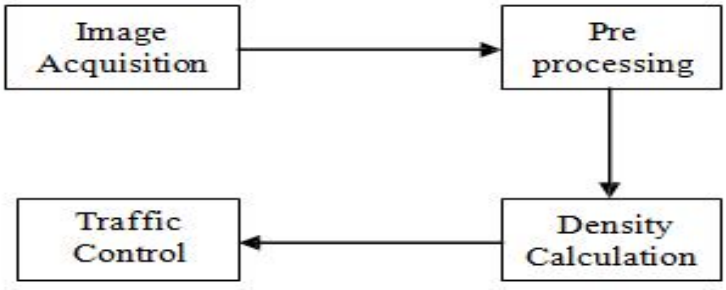


Figure 1. The four-stage basic architecture for Traffic Density Count

All the methods surveyed in this paper pursue the same basic design. Hence, you can make a comparison between all methods dependent on given four steps.

A. Image Acquisition

Every one of the techniques examines the use of cameras for the acquisition of images in this paper. In any of the tall structures a camera is installed, such as poles like traffic signal pole at intersection of traffic, hence it can catch the overall scene of street traffic. Frames of images are then removed from video caught by camera. Then frames are evaluated and pre-processed to measure density of the vehicle on the road.

B. Image Pre-Processing

To get clear picture image Pre-processing is used. Since then the images are removed from the current video outlines, the images can be dark or blurred or dull and if the climate is rainy or foggy the images can be blurred. Also, the images could be darker when captured in the evening or can be too brilliant when the afternoon is extremely bright. Along these lines, different pre- processing methods are linked to images to improve the image's nature, as indicated by the client's goal. The recordings i.e. live videos are captured by stationary cameras. At that point images from the live videos are extracted one frame in a second. The captured images are first changed to a grayscale and later to a binary. Image pre-processing is performed over these extracted frames [1]. Using motion detection, background subtraction, and object segmentation they compare two images and find the vehicle count [2]. Initially, images are taken from roads on the highway. RGB changed the scale of the images to Grayscale. At that point, gamma correction has been connected on each Grey image [4]. Then again, Canny edge detection technique, the image is first changed to grayscale and then each frame is connected to the background subtraction for the image identification strategy. After that dilation and erosion are connected by necessity for a clearer image [5]. In the static subtraction technique, the captured images are first converted to a grayscale. The grayscale is subsequently changed to binary. There after dilation and erosion are connected by prerequisite for a clearer picture [6]. Another strategy including dual technique proposes to utilize grayscale conversion along with background subtraction to identify foreground objects on a fixed background [8]. Image Pre-processing assumes an essential role in capturing images from real - time videos so that they can be influenced by the surrounding street states. The images can be distorted, dark or bright, blurred and so on. Along these lines, pre-processing enhances the nature of the image that further helps to better image analysis and count traffic density.

C. Density Count

To figure out traffic density in the ideal target area, First the vehicles are marked and then their numbers are counted. The algorithm searches for a number of interface pixels. To consider an associated area as a vehicle, a minimum threshold to consider an associated area as a vehicle has been defined. So, it may be possible to identify more than one region of vehicle utilizing the above criteria. [1]. Combination of vehicle detection & motion detection is utilized for background subtraction technique. For motion detection, the examination of two back - to - back frames in which the histogram of the key frame areas is analysed is considered. The histogram is then adjusted and determined. One requirement of this strategy is that the key region should at least have a three-pixel wide image profile on the street. The difference between the figures shows movement or displacement of object at that point. The image of the street for vehicle detection is partitioned into sub parts. At that point background subtraction method is utilized [2]. Background subtraction was used for the Canny edge detection technique. From this point, the canny edge detection strategy is linked to vehicle's edge recognition, which distinguishes each of the edges of the vehicles in the image. Canny edge detection can be feasible because it considers all neighbourhood pixels while distinguishing edges [5]. To calculate the traffic density in another strategy by applying Blob analysis and Morphological filtering on the binary image number of vehicles is checked or counted in contrast to the threshold of traffic density [11].

Table (a). Comparison of All Method

Techniques	Image Acquisition	Image Pre-processing	Density calculation
Comparison method	Uses Cameras	Grayscale conversion, Binary conversion	This technique shows comparison between one frame of the real time video and the reference image
Background subtraction method	Uses Cameras	Grayscale conversion, Binary conversion, Erosion, Dilation	Motion detection using Consecutive frame Comparison based on histogram key region and Vehicle detection using background
Radar sensor technique	Moving sensor vehicle	Sensing technologies, image processing and GIS	Ordinary least square conversion method
Canny edge detection method	Uses Cameras	Grayscale conversion, Background subtraction	Canny edge detection for vehicle edge detection, More neighbourhood algorithm for object count
Self-proposed algorithm method	Uses Cameras	Grayscale conversion, Binary conversion	Self-proposed formula and algorithm for vehicle detection
Dual method	Uses Cameras	Grayscale conversion	Using a combination of gradient magnitude and direct subtraction technique
Gradient method	Uses Cameras	Grayscale conversion, Gamma correction	Using Combination of canny edge detection and gradient based edge detection

IV. MERITS & DEMERITS OF ALL THE ALGORITHMS

Every one of the algorithms overviewed in the paper dependent on the utilization of image processing strategies to computing traffic density present on the street at any time. As you can see from the talk in the previous segment, each of the strategies has few similarities and also few differences. Every technique represents some merits and some demerits.
The merits and demerits of all the methods as shown in below table (b)-

Table (b). Merits and Demerits of All Methods

Techniques	Advantage	Disadvantage
Comparison method	Cost effective Method	This method is not used for night time
Background subtraction method	Adaptable or Scalability, Cost effective	This method is not practically implemented, No hard consequences of Execution
Radar sensor technique	Improved vehicle detection efficiency	Very expensive
Canny edge detection method	Scalability, Improved vehicle detection efficiency, Cost effective	Time expanding, Not steady with changing condition, No solution for robustness to prevention
Dual method	Less installation Cost, System considers situations of avoidance	The proposed Strategy is by all accounts complex, does not function admirably in low light Conditions
Gradient method	method proposed appears to be straight forward, makes utilization of canny edge detection which is very proficient, cost effective	Proposed framework does not have any significant bearing for evening time, image coordinating for vehicle count does not appear to be exceptionally productive
Self-proposed Algorithm	Improved productivity in traffic control and vehicle recognition, Lower maintenance cost, Less installation cost	Results get Influenced during low light Conditions

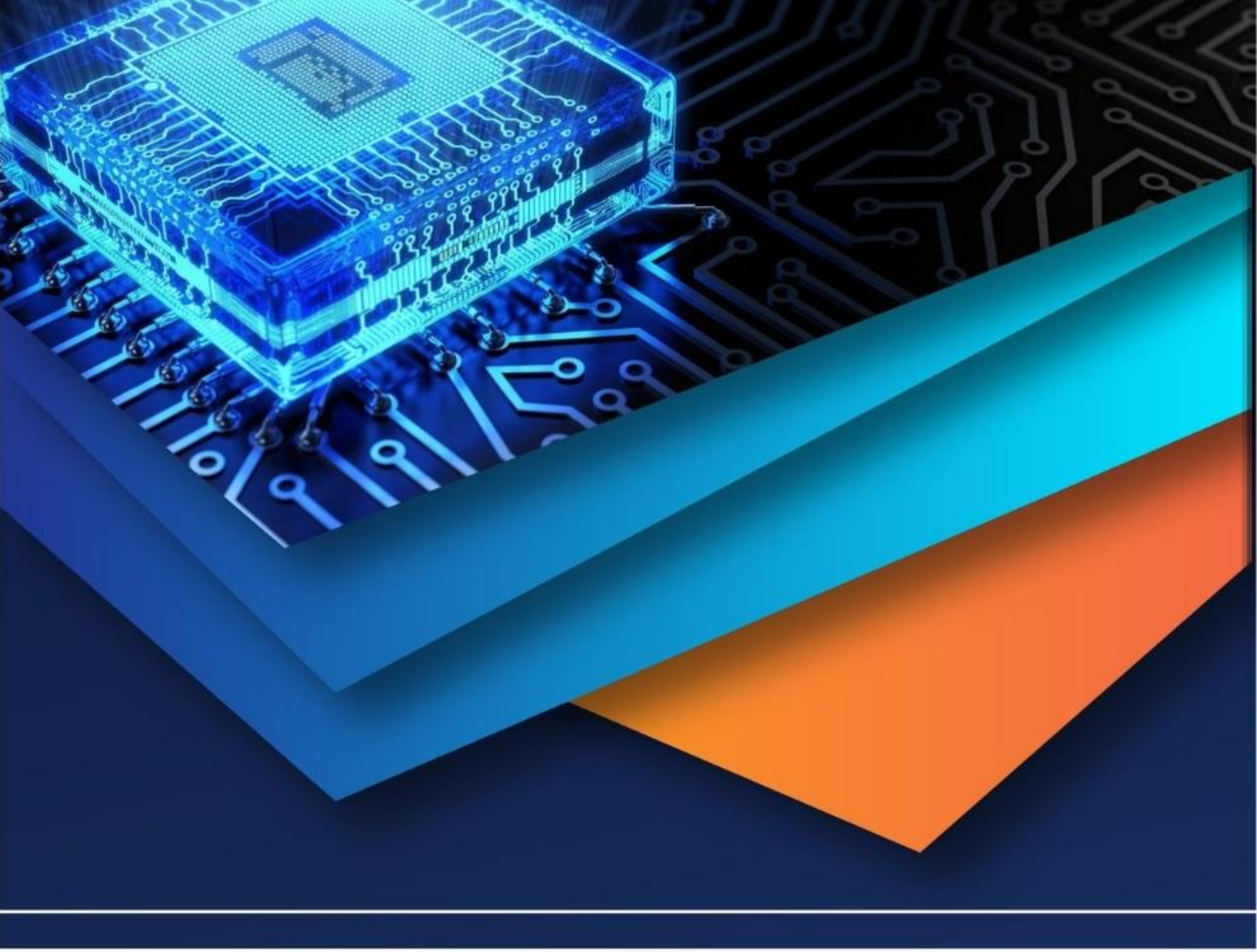
V. CONCLUSION

Calculating traffic density & Traffic controlling using image processing is an essential task for traffic administration in urban communities. Traffic congestion is turning a difficult issue. There were numerous explanations behind traffic blocking circumstances, such as incomplete traffic information, inefficient transport management, etc. Traditional methods for traffic density calculations such as radars, ultrasonic waves, loop sensors, and so on and have few impediments like sensitivity, high cost to lighting conditions, outside ecological conditions and so forth. The algorithms reviewed in this paper demonstrate a few merits as well demerits in the meanwhile. The favourable circumstances, all image processing techniques demonstrate scalability, low hardware costs, background subtraction and so on. On opposite side, they likewise demonstrate few some Inconvenience like at night-time conditions there is ineffective results, no solution to the problem of impediment and so forth. The overview on the above examined algorithms for evaluating traffic density at once on a path demonstrate that exactness for vehicle detection using image processing methods

REFERENCES

[1] Alisha Janrao, Mudit Gupta, Divya Chandwani, U. A. Joglekar, “Real time Traffic density Count Using Image Processing” International Journal of Computer Applications (0975 – 8887) Volume 162 – No 10, March 2017.
[2] Ashwini D. Bharade, Surabhi S. Gaopande, “Robust and Adaptive Traffic Surveillance System for Urban Intersections on Embedded Platform”, 2014 Annual IEEE India Conference (INDICON).
[3] Daisik Nam, Riju Lavanya, Inchul Yang, Woo Hoon Jeon, R Jayakrishnan, ITS World Congress 2017 Montreal, October 29 – November 2, “Traffic Density Estimation Using Radar Sensor Data from Probe Vehicles”.
[4] International Journal of Signal Processing, Image Processing and Pattern Recognition Vol. 5, No. 4, December 2012, “Automatic Traffic Estimation Using Image Processing”, Pejman Niksaz, Science & Research Branch, Azad University of Yazd, Iran.

[5] 2nd Int'l Conf. on Electrical Engineering and Information & Communication Technology (ICEEICT) 2015 Jahangirnagar University, Dhaka-1342, Bangladesh, 21-23 May 2015, "Real-time Area Based Traffic Density Estimation by Image Processing for Traffic Signal Control System: Bangladesh Perspective".
[6] "Speed Detection Camera System using Image Processing Techniques on Video Stream" Osman Ibrahim, Hazem ElGendy, and Ahmed M. ElShafee, Member, 2015 IEEE.
[7] "Recognition of Car Makes and Models from a Single Traffic-Camera Image", Hong sheng He, Member, IEEE, Zhenzhou Shao, and Jindong Tan, Member, IEEE.
[8] International Journal of Research in Computer and Communication Technology, Vol 4, Issue 8, August -2015, "Real Time Traffic Density and Vehicle Count Using Image Processing Technique" S. Sri Harsha, Ch. Sandeep.
[9] Anurag Kanungo, Ayush Sharma, Chetan Singla Proceedings of 2014 RAECS UIET Panjab University Chandigarh, 06 – 08 March, 2014 978-1-4799-2291-8/14/$31.00 ©2014 IEEE "Smart Traffic Lights Switching and Traffic Density Calculation using Video Processing"
[10] Mallikharjuna Rao, Santhi Kiran Bhathula, Pavankumar Yadavalli and Ramarao Kandula, "Image Processing Based Intelligent Traffic Controlling and Monitoring System Using ARDUINO"
[11] M. Vidhyia, S. Elayaraja, M. Anitha, M. Divya and S. Divya Barathi, Asian Journal of Electrical Sciences ISSN: 2249 - 6297 Vol. 5 No. 1, 2016, pp.8-12© The Research Publication, www.trp.org.in "Traffic Light Control System Using Raspberry-PI".
[12] International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor :6.887 Volume 5 Issue VIII, August 2017- Available at www.ijraset.com ©IJRASET Raspberry Pi Based Traffic Density Monitoring"
[13] Suresh Babu Changalasetty, Ahmed Said Badawy, Wade Ghribi, Haytham Ibrahim Ashwi1, "Identification and classification of moving vehicles on road" Computer Engineering and Intelligent Systems, ISSN 2222-179(paper)Vol.4, No8,2013.
[14] A. R. Zade, D. R. Dandekar National Conference on Innovative Paradigms in Engineering & Technology (NCIPET-2012) Proceedings published by International Journal of Computer Applications® (IJCA), "Simulation of adaptive Traffic Signal Controller in MATLAB Simulink Based on Fuzzy Inference System".
[15] International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 6, Issue 10, October 2017 "Raspberry Pi Traffic Density Observation Associate Controlling System", Boll Swathi, CH.S. V Maruthi Rao
[16] International Journal of Computer Applications (0975 – 8887) Volume 83 – No 9, December 2013 "Real Time Traffic Density Count Using Image Processing", Naeem Abbas, Muhammad Tayyab, M.Tahir Qadri.
[17] Pranav Maheshwari, Deepanshu Suneja, Praneet singh, Yogeshwar Mutneja "Smart Traffic Optimization Using Image Processing", 978-1-4673-6747-9/15/$31.00 ©20 15 IEEE
[18] Ms. Avani Joshi, Dr. Dhirendra Mishra, International Journal of Advanced Research in Computer and Communication Engineering, July 2015, "Review of Traffic Density Analysis Technique".
[19] 3rd INTERNATIONAL CONFERENCE ON INFORMATICS, ELECTRONICS & VISION 2014 "Smart Traffic Control System with Application of Image Processing Techniques", Md. Munir Hasan, Gobinda Saha, Aminul Hoque, and Md. Badruddoja Majumder.
[20] Khekare, G.S.; Sakhare, A.V, "A smart city framework for intelligent traffic system using VANET", Automation, Computing, Control and Compressed Sensing (iMac4s), 2013 International Multi-Conference on, vol., no., pp.302,305, 22-23 March 2013.
[21] R. Sofia Janet, J. Bagyamani, International Journal of Computational Intelligence and Informatics, Vol. 5: No. 1, June 2015, "Traffic Analysis on Highways based on Image Processing"
[22] Bharti Sharma, Vinoth Kumar Katiyar, Aravind Kumar Gupta, and Akansha Singh (2014) "The Automated Vehicle Detection of Highway Traffic images by Differential Morphological Profile", Journal of Transportation Technologies,4,150-156.
[23] A. Rahishet, A. Sahoo, Indore, Vaibhavdeshmukh and Pushpa, "Intelligent Traffic Light Control Using Image Processing," Proc. Of 21st IRF International Conference, pp. 2, 2015.
[24] Rajasheswari sunder, Santhoshs Hebber, and varaprasad Golla, Implimenting intelligence Traffic control system for congestion control, Ambulance Clearness, and Stolen Vehicle Detection " IEEE Sensors Journal, Vol. 15, No.2 February 2015.
[25] Priyanka Khanke, Prof. P. S. Kulkarni, "A Technique on Road Traffic Analysis using Image Processing", Vol. 3 Issue 2, February 2014.
[26] Cyrel O. Manlises, Jesus M. Martinez Jr. Jackson L. Belenzo, Czarleine K. Perez, Maria Khristina Theresa A. Postrero, "Real-Time Integrated CCTV Using Face and Pedestrian Detection Image Processing Algorithm for Automatic Traffic Light Transitions", 8th IEEE International Conference Humanoid, Nanotechnology, Information Technology Communication and Control, Environment and Management (HNICEM) The Institute of Electrical and Electronics Engineers Inc. (IEEE) – Philippine Section.
[27] S.Lokesh , T.Prahlad Reddy, An Adaptive Traffic Control System Using Raspberry PI, International Journal of Engineering Sciences & Research Technology.



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