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Traffic Analysis Using Image Processing to Alert Traffic Control

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Abstract:

In this paper, we present a scheme for traffic analysis using Image Processing to alert traffic control. In this framework, the vehicles are not being detected by sensors as we are detecting by using images with the help of python language. Once the image is captured from digital media, it is feed to image processing algorithm after that it detects vehicles from the image using open cv libraries, at the end vehicles are detected based on vehicle count, and time will be set as per detection so that reduction the road traffic congestion can be done. This system contains the solution to three problems of the traffic system. The mainproblem is the pre-defined set of timings set for each traffic signal despite the density circumstances. For this, we have changed the signal timings. The working would be as follows, in a traffic junction of four lanes the density is measured on each lane at a distance of 50 meters through the Image Processing. After that count the vehicle and turn on the green light for a period deepening on vehicle count ratio. This is done so that the lane having the highest density is allowed to clear the traffic first, the other lanes will be given a green signal after this in a circular pattern. If in cases where the density is greater, the signal timing is increased in fractions of second.

Keywords **—Traffic control, Computer Vision, Image Processing, Edge Detection, artificial intelligence.**

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I. INTRODUCTION

One of the very essential issues in our country is road congestion. Most nations haveautomobiles, buses, trucks, motor vehicles, motors, scooters, and bicycles. However, in India, more n more to the current routine small-scale transportation, and together substantially to the traffic, are networks of vehicles, two-wheelers still as heavy cars.This has led to more n more traffic, a higher number of accidents, cases, and an increase in commuting time over the years.

Traffic means a lot of vehicles coming and going on the road and in a big city a lot of vehicles are seen on the road. And it has become very difficult tomanage this traffic so there are a lot of accidents on the road. And this traffic is having a huge impact on

people's health, spreading various diseases. we have to use a lot of techniques to stop this traffic. People don't use public transport, they have their private vehicles, so the traffic is increasing, we have to reduce, and use image processing to control traffic and alert traffic signals. Our research paper intends that we are going to count the vehicles on the road and depending on how many vehicles are on the road, we will decide which road

to assign the time to traffic signals. Each road will have a camera that will take a photo every second of every time and from that photo, the time will be decided according to which road has the vehicles and how much time assign to the road. All these techniques will not only decrease the traffic but also control the traffic and reduce the accidents.

II. PROBLEM STATEMENT:

System for controlling traffic congestion on road using image processing methods to detect vehicles on the road and schedule traffic signal light patterns to manage and avoid vehicle congestion.

III. Related work:

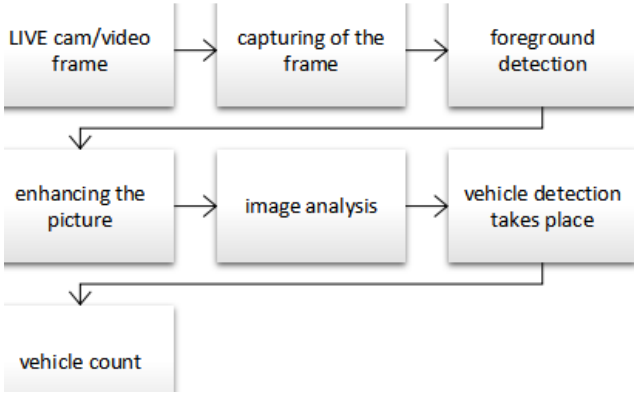

Fig. 1: Image Frame capture

In [1] this research the author has suggested implementing a smart traffic controller using real-time image processing. The filtering method is used to capture the image and video, i.e., it filters the image and removes the unwanted background, and only focuses on the cars as an object. The image processing technique is used to detect the count of vehicles on the road and the detection of vehicles or cars is also done by video. It follows these steps:

As in the [2] paper, the suggestions are cost-friendly using the image processing techniques with much more effective techniques for accurate detection of the vehicles and determining the density for tackling the traffic congestion. The author has also suggested more camera installation in the traffic lane. System based on microwave RADAR; video processing-based sensors have been used for intelligent traffic management. The author has also imposed that efficient and cost-friendly techniques of image processing based on the algorithms used for tracking the vehicles will lead to more effective performance for determining the count of cars.

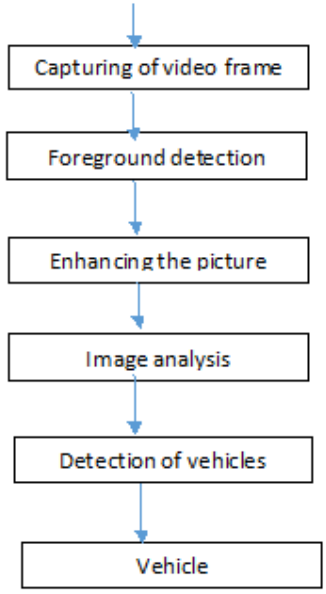

Fig. 2:Flow Chart

The [3] paper proposes the control of traffic using MATLAB code which changes the time green, red light, and orange according to traffic density and the count of vehicles. Two Arduino is used for managing green and amber light the other for managing the red light. In this system, the waiting time is deducted for the roads which are empty on the lane using MATLAB which is very useful for traffic control. The images of the empty road are captured through the live camera. The number of vehicles present on the road is calculated using the MATLAB functions. The density and the number of vehicles on the empty road will calculate the green light which will be less. More time will be given to the denser lane. As the current traffic signals are preprogrammed. They are independent of the traffic congestion on the road. Empty roads waste a lot of time. This system provides a better time control approach for controlling traffic

congestion.In [4] The paper implies a method to control the traffic by measuring real-time vehicle count using canny edge detection and digital processing. This edge detection technique is important to extract the information from the CCTV footage. Methods seem to show promising results in collecting the required data.

IV. System Implementation and Result Analysis

Following are the steps used for the implementation of the proposed system:

1) Camera /video:

To take the pictures through video it is used tocapture the frame.Here every frame in the camera is captured as one single image.We are using a night vision camera for frame capturing.

Fig. 3: Path Selection

2) Image Frame Capture:

Images are captured as frames; Frames are used to capture images one by one on video we see images only which are bombarded one after another rapidly.

Fig. 4: Video Selection

3) Image Processing:

An image is made up of several pixels,whereas apixel is very minute in an image.

It is a process of making some experiments on the image in a way to get the proper image and to make some useful data from it. There are two types to do image processing oneis digital and another is analog.To get a better quality image we use image processing. It is one of the rapidly growing technologies nowadays.

Fig. 5: Road Traffic Congestion

4) Vehicle Detection:

Detects vehicles from images using open cv based classification techniques. Open cv package in those classified techniques are their open cv classification is class in that cascade classifier object detection module we get in that the cascade classifier is set in open cv obj detection is done currently in the project we have given vehicle detection module and due to that vehicle detection is been done. Cannel is the function used for edge detection in grayscale here vehicle key points are stored in Storage-cascade classifier in that we aredetecting object car module are we have putthere ready data set of car model data set in image processing.

5) Before image processing

Fig. 6: Before detection

As we can on read cars are moving from one place to another this is been done before imageprocessing. Vehicle detection Is composed ofidentifying the detected vehicle constantly in video order. It is done by making the boundary around the captured vehicle. This system goes on without any person's interference and is completely
automatically generated, as it uses intelligent traffic control and analysis using image processing.

6) After image processing is done vehicle detection

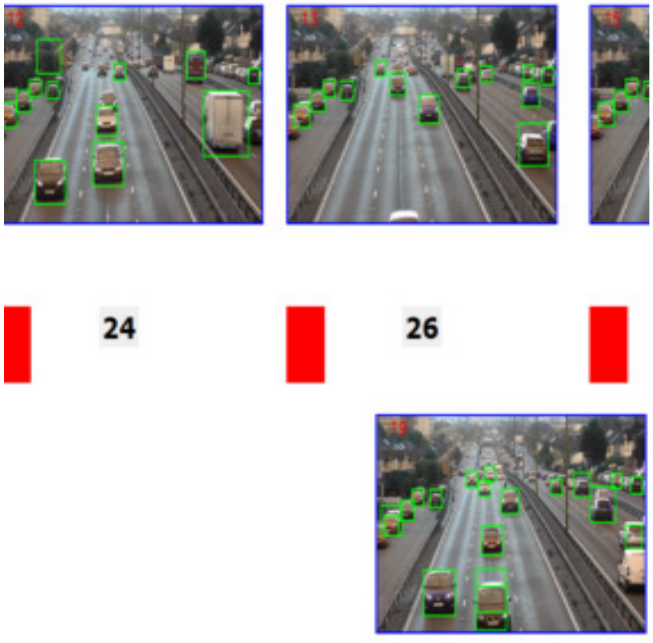

Fig. 7: After detection

Vehicle Count:

Counting vehicle is a custom function that detects the count of cars that crossed the road. Every moving car object below ROI (Region of Interest) is tracked based on its place and can be mixed with the number of detected things placed.for a latest position or position not included in the criteria of tracked objects .it will be added as a new vehicle, if the initial place was mixed in the list of positions or previously tracked objects, it means the place had already been gathered as a detected vehicle. The car will be detected till it goes out of the region,every image is compared with the previous image, if the vehicle is present in both the images and the differencein their x and y coordinates is lower than max(width, height)pixels, then we considerthem as 2 separate vehicles. Vehicle tracking Is composed of the detected vehicle 6continuously in a video sequence. It is done by making the boundary around the captured vehicle. This system works without any person's interference and is completely automatically generated, as it uses intelligent traffic control and analysis using image processing.

7) Timer Control:

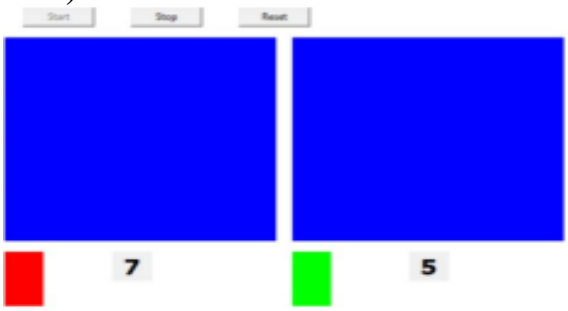

Fig. 8: Timer set as per vehicle count

After vehicle detection based on vehicle count time will be set as per the traffic. After counting the number of vehicles Calculate the time required to traffic signal light ON/OFF period and send the command to hardware as per schedule. With the timer controller, we can control heavy trafficcongestion in just a couple of seconds (100 seconds).

Advantages Over Existing System [5-13]:

- In the previous system for controlling road traffic and avoiding congestion, manpower was used but that was not sufficient so the traffic signal system was developed now in our project we are using an intelligent traffic control system using image processing.
- Here we are using a night vision camera for detecting the vehicles where every image in the camera frame is going to be captured like one single image.
- The major motto of our project is to save time while traveling on road and to avoid congestion.
- For that we are going to set the timer as per vehicle count for that car models are set in the dataset.
- After detection, every vehicle is going to get equal time to pass away, which avoids traffic congestion.

V. Conclusion

In Prior system, manpower was used but that was notsufficient due to heavy road traffic congestion. Thenthe traffic light signals came into existence but it was not sufficient and was time-consuming.To overcome this, we have proposed anovel framework for intelligent traffic control systemusing image processing. It helps inreducing time and passes vehicles easily using edge detection and image processing technique. In future we will try to implement optimization techniques for reducing the computation time.

References

[1]AI Hussain Akoum, Department CCNE,Lebanese University, Saida,Lebanon, hussein_akoum@hotmail.com.

[2] Srinivasan Rajendran, SRM Institute of Scienceand Technology.

[3] Taqi Tahmidand Eklas Hossain, KhulnaUniversity of Engineering and Technology, Dept. Of EEE, Khulna 9203, Bangladesh,2Oregon Tech, Department of Electrical Engineering and Renewable Energy. OR-97601, USAtaqitahmid@gmail.com,eklas.hossain@oit.edu.

[4] Khushi, Department of Telecommunication Engineering, Bangalore Institute of Technology, Karnataka, India.

[5] Abolfazl Mehbodniya, Izhar Alam, Sagar Pande, Rahul Neware, Kantilal Pitambar Rane, Mohammad Shabaz, Mangena Venu Madhavan, "Financial Fraud Detection in Healthcare Using Machine Learning and Deep Learning Techniques", Security and Communication Networks, vol. 2021, Article ID 9293877, 8 pages, 2021. https://doi.org/10.1155/2021/9293877

[6] Dongre, Nikhil M., and Tejas S. Agrawal. "A Research On Android Technology With New Version Naugat (7.0, 7.1)." IOSR Journal of Computer Engineering 19.02 (2017): 65-77.

[7] Madhavan, M.V., Khamparia, A., Gupta, D. et al. Res-CovNet: an internet of medical health things driven COVID-19 framework using transfer learning. Neural Comput & Applic (2021). https://doi.org/10.1007/s00521-021-06171-8

[8] Madhavan, Mangena Venu, et al. "Recognition and classification of pomegranate leaves diseases by image processing and machine learning techniques." Computers, Materials & Continua 66.3 (2021): 2939-2955.

[9] Yadav, Neha, et al. "HSV model□based segmentation driven facial acne detection using deep learning." Expert Systems 39.3 (2022): e12760.

[10] Nanda, S.K., Ghai, D., Pande, S. (2022). VGG-16-Based Framework for Identification of Facemask Using Video Forensics. In: Gupta, D., Polkowski, Z., Khanna, A., Bhattacharyya, S., Castillo, O. (eds) Proceedings of Data Analytics and Management. Lecture Notes on Data Engineering and Communications Technologies, vol 91. Springer, Singapore. https://doi.org/10.1007/978-981-16-6285-0_54

[11] Aherwadi, Nagnath B. and Chokshi, Deep and Pande, Dr. Sagar and Khamparia, Aditya, Criminal Identification System using Facial Recognition (July 12, 2021). Proceedings of the International Conference on Innovative Computing

&Communication (ICICC) 2021, Available at SSRN: https://ssrn.com/abstract=3884827 or http://dx.doi.org/10.2139/ssrn.3884827

[12] Pimple, K.M., Likhitkar, P.P., Pande, S. (2022). Convolutional Neural Networks for Malaria Image Classification. In: Gupta, D., Polkowski, Z., Khanna, A., Bhattacharyya, S., Castillo, O. (eds) Proceedings of Data Analytics and Management. Lecture Notes on Data Engineering and Communications Technologies, vol 91. Springer, Singapore. https://doi.org/10.1007/978-981-16-6285-0_37

[13]Harshitha D, Harshitha S P, Ifra Anjum, Indushree V P, 2019, IoT Based Smart Traffic Signal Monitoring System, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) NCRACES – 2019 (Volume 7, Issue 10).

