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DENSITY BASED TRAFFIC LIGHT CONTROL USING TURTLE GRAPHICS

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Abstract: The significant growth in the number of vehicles and the long intervals between traffic lights make traffic control more challenging nowadays. To address this issue, we can implement an image-processing-based traffic-light control system. In place of electronic sensors, the proposed system will detect vehicles through images. The cameras positioned next to the traffic signal will take pictures of the lanes, and the Image Processing technique in Python may be used to calculate the number of vehicles in each lane. And the lane with the highest count will take precedence over the other lanes. The traffic light is regulated by the amount of traffic on the road, thus using this technology is beneficial for analysis and performance. With the modern world continuously becoming very fast-paced each and every person is always trying to make the most of his time. It is very much required that any person doesn't waste a lot of his crucial time on a petty activity like traveling. Along with this driving in streets with a lot of traffic has been scientifically proven to be the cause of very high mental strain and pressure. So it is a basic requirement in modern-day cities to have a dynamic model of the traffic signal to control the transportation in the area

Keywords: Traffic signal control, image processing, object detection, YOLOv4, traffic light

1.INTRODUCTION

Coming to the present case of traffic lights across the cities, it can be noted that it is static and is always the same for any lane, even though the traffic in those lanes may not be the same. This causes some lanes to become empty while some lanes are too congested and this is a waste of time for people and also a waste of resources as a lot of fuel is wasted while not moving.

Along with this in congested lanes the traffic light is for a very less duration, so many people tend to cut the traffic light and this may be the cause of various road accidents. Coming to the most important point of why we require dynamic traffic lights is that there are many emergencies occurring and it is required for emergency vehicles like police, ambulance, and fire trucks to reach these situations in the proper time as this is the case of life or death. For all these reasons we can say that dynamic traffic control is the best solution. In a dynamic traffic light the waiting time of a signal changes with respect to the number of cars in the lane and thus nearly all the lanes become equally congested or equally empty. Thus the average waiting time of all the people at the traffic light is reduced.

2 LITERATURE REVIEW

Dynamic Traffic System Based On Real Time Detection of Traffic Congestion[1], The paper proposes a dynamic traffic system that takes in present traffic footage and calculates the percentage congestion and based on this, allocates the timer to each signal.Uses image processing for Background subtraction and Edge Detection.

Smart Traffic Light Switching/Traffic Density Calculation using Video Processing[2], This paper presents a method to use live video feed from the cameras at traffic junctions for real time traffic density calculation using video and image processing. Used for 4 way junction detection which shows 35% improvement in congestion and allows Traffic light synchronization enabling free flow of traffic.

Density and Time based Traffic Control System using Video Processing [3], This paper discusses the idea of a traffic signal system by detecting traffic density and adjusting the signal accordingly. Uses haar cascade algorithm providing high accuracy.

3 PROPOSED METHODOLOGIES

Existing System:

OpenCV accompanies a coach just as identifier. In the event that you need to prepare your own classifier for any article like vehicle, planes and so on you can utilize OpenCV to make one.

Its full subtleties are given here:

Cascade Classifier Training.

Proposed Solution:

After preprocessing like resizing and cropped images, Haar cascade classifier is used to detect whether there is a single face detected or not. Figure 3 demonstrates the flow chart for the proposed system. Edge, line, and center surround are the features of Haar which are acting as inputs. By these cascade features the test of the image is done. The features of Haar are divided into various different stages. Stage by stage the window will be tested. Usually, initial stages will

have less Haar-like features. If the first stage window fails, then it is to be discarded and the next stages will not be tested. If all the stages successfully passes then it is considered to be face is detected and checks with the images already stored in database of raspberry Pi. The advantage of Haar cascade classifiers is fast detection speed compared to other classifiers.

3.1 BLOCK DIAGRAM

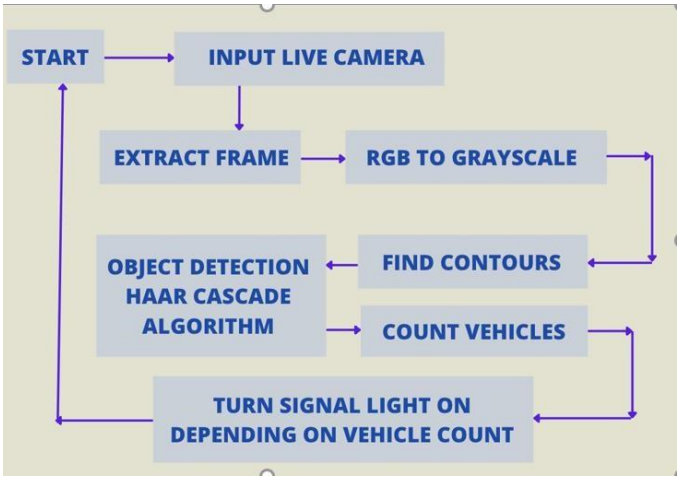

Figure 1: Block diagram

With the traffic increasing day by day in each and every city the static system of the present day is becoming time consuming and inconvenient. It comes to our notice when we see some lanes being completely full and still suffering in red light stoppage for a long time while some lanes are so empty that providing them a long green light time does not make any sense.

The setup uses the cascade classifier (XML file) model which is a trained model having data on vehicle detection. The code traffic2.py uses this trained model to find the number of vehicles. The code is given an input of four random images, showing vehicles at a traffic stop one from a camera input and other three from the images folder, herein the XML file is executed by the current running code.

The vehicle detection and counting operation executes and 4 variables store the count on the number of vehicles from each of the 4 input images respectively. The variables passed are given as input to the GPIO pins to display red, yellow and green light operation a four way traffic signal in synchronization with each other using the signal modules. After getting image from live camera it extracts the frame whre it captures a signle frame from a video.

It is very important step for further vehicle dtetion and count. After we got a frame image converts from rgb to graycycle this process helps to simplify the further complications. After successful Conversion of image to graycycle every repeating object from image is stored in memory by help of counters. later with the help of haar cascade vehicles are detected after detection of vehicle it counts the vehicle which helps to detect the density on the road. On the basis of density preference signal lights will be turn on and off.

4 SIGNIFICANCE AND SCOPE

Prioritizing the traffic light if the presence of emergency vehicles like ambulances, police vans or fire trucks is detected in the particular lane so that these emergencies can be handled in a better way. Allowing face detection in this system so that green light for pedestrians can also be brought into use. The accuracy of the system can be improved by bettering the data set in Haar Cascade Algorithm. Identification of vehicles in various angles by the system can be brought into the haar cascade to improve its accuracy.

5 RESULTS

After taking the live image of traffic we will get vehicle count on road image. It will give preference on based of density of vehicles. Signal turn on and off according to preference. We took below picture as a example for lane one.

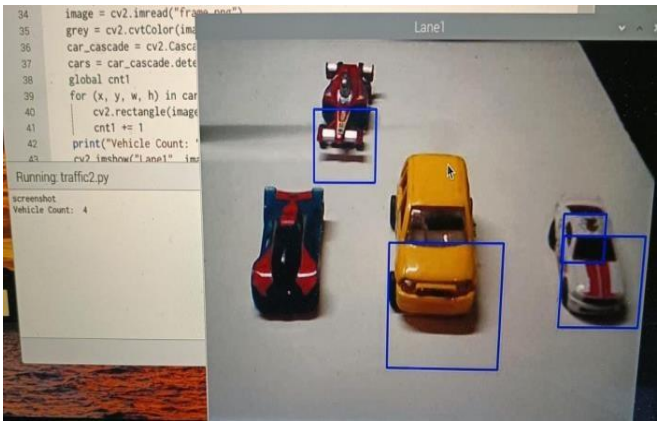

Fig. 5.2 Vehicle detection by haar cascade

As we can see in above image it detects the vehicle and on basis of car count below picture shows us signal turn green for lane one .

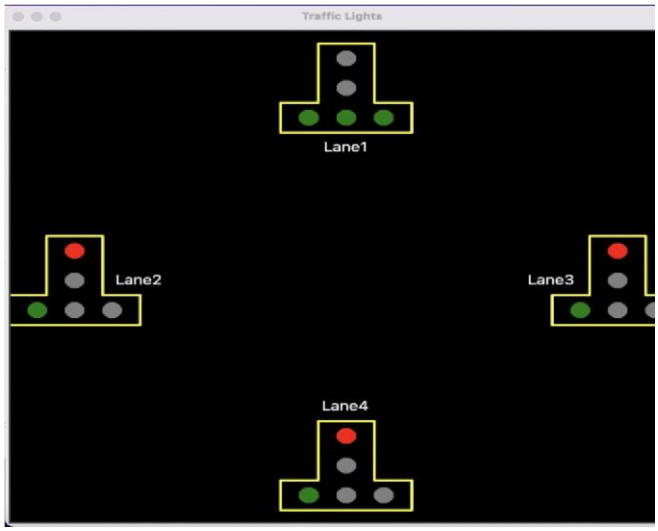

Fig 5.3 signal for lane one

Above same execution is carried out for Lane 2, 3 and 4 as well. The vehicles at each Lane are detected continuously in a while loop and vehicle count results are obtained, accordingly the delay for the green light is set.

6 CONCLUSIONS

Various methods of managing traffic are present but traffic light monitoring is the most important method so that loads of time is saved by the people who are traveling. Our dynamic traffic signal enables road accidents to be reduced by a large amount. It provides an efficient algorithm to save time spent on traveling We concluded that if limited RAM is present then Haar Cascade is a great way to get things going which can run this Algorithm properly but with very poor detection accuracy. We also concluded that the Yolo Algorithm requires a high amount of RAM (more than 1GB) for highly accurate results.. Hence the code terminates abruptly. Finally concluded that our solution is the best alternative possible in the market as it provides a fast and accurate way to reduce time consumed in traffic.

REFERENCES

1) By Aditya Rao, Akshay Phadnis, Atul Patil, Tejal Rajput and Dr. Prof. Pravin Futane On 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA)

2) By Anurag Kanungo, Ayush Sharma and Chetan Singla On 2014 RAECS UIET Panjab University Chandigarh

3) By Tanvi Sable, Nehal Parate, Dharini Nadkar, Swapnil Shinde On ITM Web of Conferences 32 (ICACC - 2020)

4) Sai Surya Prakash Moka, Sai Manikanta Pilla, S.Radhika, "Real-Time Density Based Traffic Surveillance System Integrated with Acoustic Based Emergency Vehicle Detection", 4th International Conference on Computer, Communication and Signal Processing (ICCCSP) ,(2020)

5) Uthara E. Prakash, Athira Thankappan, "Density Based Traffic Control System Using Image Processing", International Conference on Emerging Trends and Innovations in Engineering and Technological Research (ICETIETR), (2018).