



Smart Control And Effective Traffic Management Using Artificial Intelligence

B.V.B.S.ANUSHA¹, S. VENKATESWARA RAO²

¹Student (M.Tech), Department of CSE , MVR College of Engineering & Technology, A.P, India.

²Assistant Professor, Department of CSE , MVR College of Engineering & Technology, A.P, India.

Abstract: The project developed by us will enable the traffic light to switch from red to green based on traffic density. The easy way to control a traffic light by using timer for each section since, we proposed a system for controlling the traffic light by image processing. This paper presents an adaptive traffic light controller based on fuzzy logic for improving the traffic flow on an isolated intersection. A set of fuzzy rules has been made that, using the collected information from road detectors (queue length, arrival flow, and exit flow), computes the amount of time for which the next phase should be shortened or extended. The proposed fuzzy control system is constituted of two parts: one for the primary driveway (with a higher volume of vehicles) and for the secondary driveway (with a lower volume of vehicles).

1. INTRODUCTION

Traffic congestion is becoming one of the critical issues with increasing population and automobiles in cities. Traffic jams not only cause extra delay and stress for the drivers, but also increase fuel consumption and air pollution. Although it seems to pervade everywhere, megacities are the ones most affected by it. And its ever increasing nature makes it necessary to calculate the road traffic density in real-time for better signal control and effective traffic management. The traffic controller is one of the critical factors affecting traffic flow. Therefore, the need for optimizing traffic control to better accommodate this increasing demand arises. In India traffic is enlarge four times faster than population. Nowadays, so many countries suffer from the traffic congestion issues that affect the transportation method in cities and cause serious trouble. Even though replacing traffic officers and custodian by automatic traffic systems, the optimization of the heavy traffic jam is still a big issue to be faced, especially with several junction nodes. Traffic jams also build many other critical issues and problems which sprightly affect the human routine lives and sometime reason for



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death for example if there is an emergency vehicle like ambulance on the roadway going with critical patient. In that situation if an ambulance gets stuck in a large traffic jam then there are high chances that the patient can't reach the hospital on time. It is very key to design an advanced traffic system which controls traffic intelligently to avoid accidents, collisions and traffic jams. If one path has less traffic and the other path with high traffic but the duration of green light for both paths is same then this is the waste of available time and is inefficient. By considering the above example if the path with higher traffic density should glow green signal light for a longer period than the path with lesser density. This technique is based on the calculation of the traffic density by correlating the live traffic image with a reference image.

2. LITERATURE SURVEY

1.A. Zaid, Y. Suhweil and M. A. Yaman

Abstract:

Traffic jam and traffic accidents become serious problems especially in crowded cities, which wasting time and money. Traffic light is basic element in control traffic flow through specify waiting and going time, fixed traffic light time systems is bad control way, since number of cars is not consistency with each traffic light, thus lead to imbalance system. Intelligent transportation system including smart way to control traffic light time based on number of cars in each traffic light, this paper develops an automatic algorithm to control traffic light time based on artificial intelligent techniques and image for cars on traffic lights, this algorithm is validated by compare its results with manual results. Applying following proposed algorithm in transportation system will regulate traffic flow and reduce traveling and waiting time wasted in roads.

2.RenjithSoman: Now a days as the population increases the transportation demands are increased. The total number of vehicles required to fulfil the transportation needs too are increased just as population have increased. Increase of the vehicle usage leads to heavy



traffic in the road. It happens due to the current traffic control method and the road infrastructure. It will affect the human as well as fuel resources by wasting time in the road because of the heavy traffic. In order to reduce the wastage of time as well as the wastage of fuel in the road traffic an effective and a smart traffic control strategy is required. The traditional way of traffic control provides a time slot for each direction of road. Another advanced method is placing some proximity sensors on the road. This sensor gives the data about the traffic on the road. According to the sensor data the traffic signals are controlled. This project proposes a new way of traffic control. A digital camera installed with traffic signal light used to capture the live road images. Then the captured images are fed into digital image processor to find the traffic density on the road then the traffic signals are controlled. The proposed system helps to use the time and fuel resources efficiently by avoiding the time wasted on the empty road.

3.A.Kanungo, A. Sharma and C. Singla

Congestion in traffic is a serious problem nowadays. Although it seems to pervade everywhere, mega cities are the ones most affected by it. And it's ever increasing nature makes it imperative to know the road traffic density in real time for better signal control and effective traffic management. There can be different causes of congestion in traffic like insufficient capacity, unrestrained demand, large Red Light delays etc. While insufficient capacity and unrestrained demand are somewhere interrelated, the delay of respective light is hard coded and not dependent on traffic. Therefore the need for simulating and optimizing traffic control to better accommodate this increasing demand arises. In recent years, video monitoring and surveillance systems have been widely used in traffic management for traveler's information, ramp metering and updates in real time. The traffic density estimation and vehicle classification can also be achieved using video monitoring systems.

3. SYSTEM ANALYSIS

In the first method, VANETS are used to get information and location of every vehicle, which in turn is passed on to the nearest Intelligent Traffic light with the help of installed GPS



Further, these ITLs will update the statistics and sent it to nearby vehicles. In case of accidents, the information would be sent to drivers to choose an alternate route to avoid congestion. However, this technique is not feasible as its deployment is quite expensive. • In the second method, infrared sensor-based microcontrollers are used, which capture the unique ID of every car using transmitter and receiver. In case of an emergency situation, vehicle's radio frequency tags can be used to identify them and let other vehicles move. This method detects red light violations. However, this technique is not flexible due to the fact that infrared sensors need to be in sight

Limitations of Existing Methods:

In the third method, fuzzy logic technique is used in which two fuzzy logic controllers are used – one is to optimize the signal and the other controller is used to extend the green phase of a road in an intersection. The sensors used to collect input data are video cameras that are placed at incoming and outgoing lines. The controller then utilizes the information collected through these sensors to make optimal decisions and minimize the goal function. • In the fourth method, fuzzy logic is used, and the system takes in the number of vehicles and the average speed of traffic flow in each direction as the input parameters. The number of vehicles and the average speed of traffic flow can be determined using sensors placed on the road.

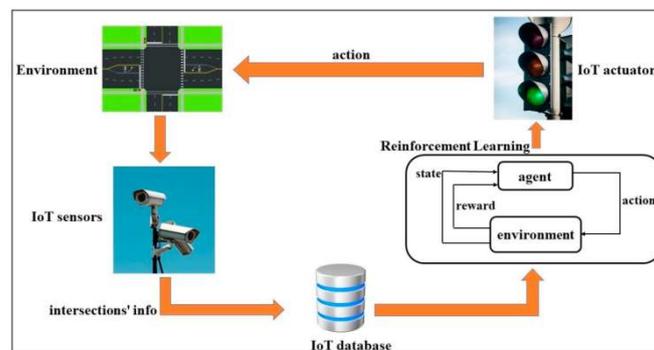
4. PROPOSED SYSTEM

Now-a-days due to increasing number of vehicles it's becoming difficult to manage traffic efficiently which leads to longer duration journey and maximum petrol consumption and to avoid this problem standard techniques was introduce such as manual traffic control which require more number of traffic person, static time traffic control which is not effective as it will use same timer for all lanes with heavy and light traffic and sensor based traffic management but this require heavy budget of sensor deployment to sense and manage traffic based on density.

To overcome from above issues author of this paper is utilizing traffic cameras and YOLO object detection algorithms to estimate traffic density at all lanes and then adjust red and green signal time. Cameras will take snapshot of all lanes every five seconds and then estimate traffic at lanes and based on density green and red signal time will be adjusted.

Proposed Methodology:

The number of vehicles of each class, such as car, bike, bus, and truck, is detected, which is to calculate the density of traffic. The signal switching algorithm uses this density, among some other factors, to set the green signal timer for each lane. The red signal times are updated accordingly. The green signal time is restricted to a maximum and minimum value in order to avoid starvation of a particular lane. A simulation is also developed to demonstrate the system's effectiveness and compare it with the existing static system



5. RESULTS

To run project double click on 'run.bat' file to get below output



In above screen click on ‘Run Traffic Simulation’ button to start PYGAME simulation and get below output



In above screen you can see PYGAME simulation output and at each lane traffic density is calculated and then adjust green and red line. This simulation run in INFINITE loop so you press ‘windows’ key from keyboard and then close application and then restart and run second YOLO module

6. CONCLUSION

In conclusion, the proposed system sets the green signal time adaptively according to the traffic density at the signal and ensures that the direction with more traffic is allotted a green signal for a longer duration of time as compared to the direction with lesser traffic. This will lower the unwanted delays and reduce congestion and waiting time, which in turn will reduce fuel consumption and pollution. According to simulation results, the system shows about 23% improvement over the current system in terms of the number of vehicles crossing the



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intersection, which is a significant improvement. With further calibration using real- life CCTV data for training the model, this system can be improved to perform even better

7. REFERENCES:

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