

TRAFFIC SIGNAL CONTROL MANAGEMENT USING AI & ML TECHNIQUES

Dr.D. Rathna Kishore¹, J. Vamshi Krishna², Shaik Roshan³, G. Phanidhar⁴

Associate Professor¹, B.Tech Students^{2,3,4}

*Department of Information Technology

** ANDHRA LOYOLA INSTITUTE OF ENGINEERING & TECHNOLOGY

Abstract- Traffic congestion has been a problem affecting various metropolitan areas. This can result in various problems such as untimely delays to commuters, increase in carbon dioxide emissions and increase in travel time. The current traffic control systems fail to consider the volume of traffic in a particular junction i.e. the duration of the green or red signal is fixed and does not depend on the density of vehicles. Here we are reviewing the paper which provides the solution to the current traffic control systems with the help of Haar Cascade algorithm. This paper also compares the solution with the current traffic control systems as well as another solution which uses the concept of q learning.

Keywords- density of vehicles, Haar Cascade algorithm, Concept of q learning.

I. INTRODUCTION

The Rising traffic congestion is an inescapable condition in large and growing metropolitan areas across the world. Traffic congestion is not primarily a problem, but rather the solution to our basic mobility problem, which is that too many people want to move at the same times each day. Because efficient operation of both economy and school systems requires that people work, go to school, and even run errands during about the same hours so they can interact with each other fast transportation systems and rapid transit systems are nerves of economic developments for any nation. Mismanagement and traffic congestion results in long waiting times, loss of fuel and money. Therefore, having a fast, economical and efficient traffic control system for national development is of greater importance. Monitoring and controlling city traffic is becoming a major problem in many countries. Current traffic control techniques involving magnetic loop detectors buried in the road, infra-red and radar sensors on the side provide limited traffic information and require separate systems for traffic counting and for the traffic control system. Inductive loop detectors do provide a cost-effective solution, however they are subjected to a high-failure rate when installed in poor road surfaces, decrease pavement life and obstruct traffic during maintenance and repair. With the ever increasing number of vehicles on the road, the Traffic Monitoring

Authority has to find new methods of overcoming such a problem and equipment to improve the state-of-the-art of traffic control.

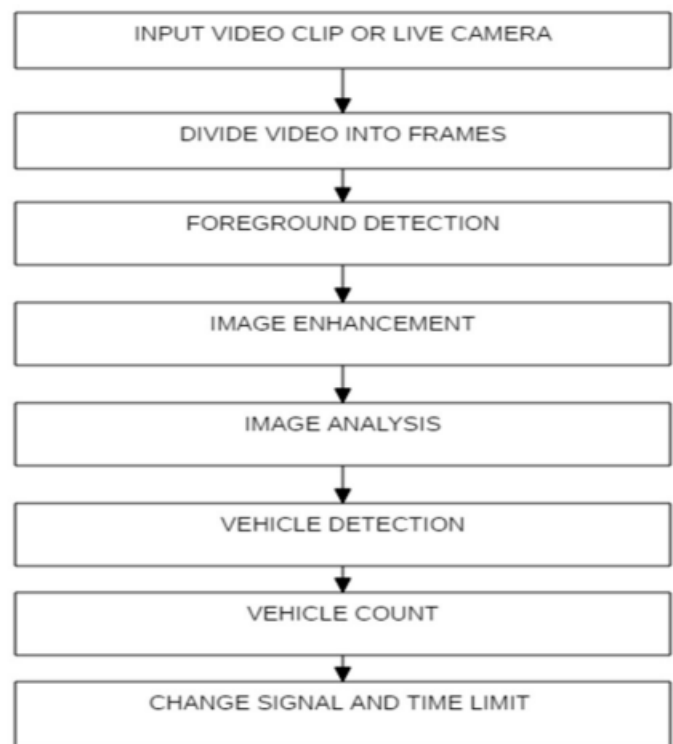


Fig. Process Diagram

II. AIM & OBJECTIVE

This project will help to reduce traffic congestion and unnecessary waiting at Signals. The main aim in designing and developing the Smart Traffic Signal Simulator is to reduce the waiting time of each lane of the vehicles. This project is mainly used at junctions because traffic at junctions is very high. OpenCV is used to analysis image to find objects. Inbuilt libraries are used to detect object in each image based on training set which is in form of XML.

III. EXISTING SYSTEM & ITS LIMITATIONS

The existing system is where the traffic is being monitored by either traffic police or by sensors to measure density which are attached near the signals. Traffic signals operating on fixed signal

timing delays do not adjust to the changing traffic density. When the traffic density increases more than a limit at one particular side, it needs a longer green light duration to ease traffic flow. This

system uses a microcontroller of the 8051 family that is interfaced with IR sensors. These IR sensors are used for line of sight object detection using which the system gets an input of the traffic density. Traffic density is measured as “low, medium and high”. Old search result of blog.

IV. PROPOSED SYSTEM & ITS ADVANTAGES

The main goal of the proposed work is to improve the Traffic Control by adding the necessary additional features and new technologies into the application. We propose a system for controlling the traffic light by image processing. The vehicles are detected by the system through images instead of using electronic sensors embedded in the pavement. A camera will be placed alongside the traffic light. It will capture image sequences. Image processing is a better technique to control the state change of the traffic light. It will capture image sequences. Image processing is a better technique to control the state change of the traffic light. It shows that it can decrease the traffic congestion and avoids the time being wasted by a green light on an empty road. It is also more reliable in estimating vehicle presence because it uses actual traffic images. It visualizes the practicality, so it functions much better than those systems that rely on the detection of the vehicles' metal content.

V. ANALYSIS MODEL

The model that is basically being followed is the WATER FALL MODEL, which states that the phases are organized in a linear order. First of all, the feasibility study is done. Once that part is over the requirement analysis and project planning begins. If system exists one and modification and addition of new module is needed, analysis of present system can be used as basic model. The design starts after the requirement analysis is complete and the coding begins after the design is complete. Once the programming is completed, the testing is done. In this model the sequence of activities performed in a software development project are: Requirement Analysis, Project Planning, System design, Detail design, Coding, Unit testing, System integration & testing. Here the linear ordering of these activities is critical. End of the phase and the output of one phase is the input of other phase. The output of each phase is to be consistent with the overall requirement of the system. Some of the qualities of spiral model are also incorporated like after the people concerned with the project review completion of each of the phase the work done. WATER FALL MODEL was being chosen because all requirements were known beforehand and the objective of our software development is the computerization/automation of an already existing manual working system.

VI. SYSTEM DESIGN

System design shows the overall design of system. In this section we discuss in detail the design aspects of the system. Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. System Design is A creative process • No cook book solutions Goal driven • We create a design for solving some problem Constraint driven • By the function to be served and the constructions which are possible Good designs can be recognized • Simple, coherent, adequately meets requirements, adaptable. System design transforms the analysis model by:- Defining the design goals of the project Decomposing the system into smaller subsystems Selection of off-the- shelf and legacy components Mapping subsystems to hardware Selection of persistent data management infrastructure Selection of access control policy Selection of global control flow mechanism Handling of boundary conditions.

VII. FINAL OUTPUT

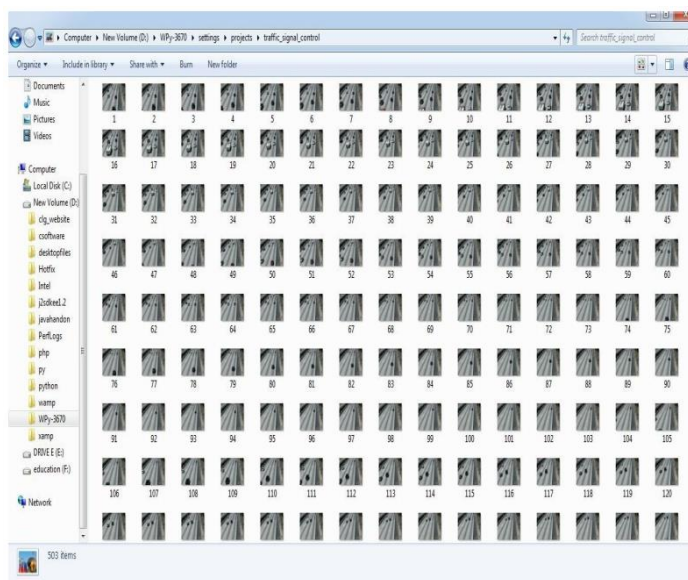
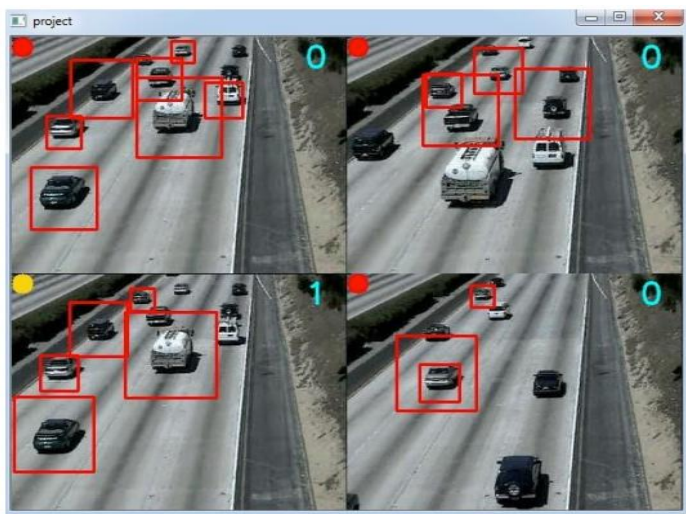


Fig: Video into frames stored in folder



CONCLUSION

The storage issue of many decades has been solved by utilizing the services of cloud platform which has largest online storage with speed and reliable cost. Opportunities in this world always exist; we are the one who is responsible to convert them into a real-time environment. This is done by using the camera images captured from the road lanes. Each image is processed separately and the number of cars has been counted. This system guarantees that the average waiting time of the vehicle in front of traffic signal will be lesser than present traffic control systems, also the techniques and algorithms used in this project promises to be more effective as compared to the previous system.

REFERENCES

- [1] [1]. Fahreena Shaikh, Naisha taban khan, Saima Zareen Ansari, "Controlling Traffic Light Signals to Implement Traffic Scheduling Using Density Calculation" (ICAET15TR012000), February 2015
- [2] [2] Sabya sanchi Kanojia "Real time light control and congestion avoid system" (IJERA), March-April 2012
- [3] [3]. Payal Gupta, Dhananjay V. Gadre, Tarun Kumar Rawat "Real Time Traffic Light Control System" (Hardware and Software Implementation) (ijeev7n5_10), 2014
- [4] [4]. R Nithin Goutham, J. Sharon Roza, M Santhosh "Intelligent Traffic Signal Control System" (International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering), May 2014
- [5] [5] Prof. Uma Nagaraj, Jitendra Rathod, Prachi Patil, Sayali Thakur, Utsav Sharma "Traffic Jam Detection Using Image Processing" (IJERA), March-April 2013
- [6] [6] G Lloyd Singh, M Melbern Parthido, R Sudha "Embedded based Implementation: Controlling of Real Time Traffic Light using Image Processing" (NCACSA 2012) Proceedings published in International Journal of Computer Applications® (IJCA), 2012
- [7] [7] Meru A.V, MUJAWAR I. I "Computer Vision based vehicles Detection and Counting for Four Way Traffic" (International journal of Advanced Research in Computer Science and Software Engineering) (IJARCSE), February 2015
- [8] [8] George Law "Quantitative Comparison of Flood Fill and Modified Flood Fill Algorithms" (International Journal of Computer Theory and Engineering), June 2013
- [9] [9] Prof Mrs Priti Tyagi, Mr Sandeep Oberoi, Mr Satish Sonawane, Tejal Rane and Mahip Shrawag "Control of Real Time Traffic with the Help of Image Processing" IRET Transaction on Image Processing (ITIP), April 2014
- [10] [10] Naeem Abbas Sir Syed, Muhammad Tayyab Sir Syed, M. Tahir Qadri Sir Syed Real Time Traffic Density Count using Image Processing (International Journal of Computer Applications), December 2013

AUTHORS

Dr. D Rathna Kishore¹ M.Tech, Ph.D., Associate Professor, Department of IT.

J. Vamshi Krishna² B.Tech, Andhra Loyola Institute of Engineering & Technology

Shaik Roshan³ B.Tech, Andhra Loyola Institute of Engineering & Technology.

G. Phanidhar⁴ B.Tech, Andhra Loyola Institute of Engineering & Technology.