Advanced Traffic Control Management System

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Abstract— In this paper we are going to propose a methodology for determining traffic congestion on roads using image processing techniques and a model for controlling traffic signals based on information received from images of vehicle present on the roads taken by video camera. In a video frame instead of calculating number of vehicle we are going to calculate the area occupied by the vehicle on the road in the terms of pixels. Variable traffic cycle and weighted time these two parameters are considered for each road based on density of vehicle and sequence of control traffic lights.

Key words: Advance Transportation System, Traffic Light, Image Processing, Edge Detection, Traffic Density Calculation

I. INTRODUCTION

Traffic congestion is when vehicle travel at slower speed because there are more vehicle on than the road can handle this make trip times longer, and increase queuing this is the major problem occur in day today life in big cities. It is important to have a smart traffic control system to assure a safe transportation. The very first step to do that is to acquire condition of traffic i.e density of vehicles present on the road. From different sensors we can take the information of traffic congestion. Induction loop, infra-red light sensor, optical flow etc these examples of sensors.

In day to day life image processing techniques [14] has been very important and promising topic to deal with traffic related problems because of its ease of maintenance and being more smart as well as intelligent system. Different methods [2]-[5] have been proposed to acquire traffic information. Most of the work detects edge of the vehicles and counts the number of vehicle present on the road. However the disadvantage of the method is that counting the number of vehicles may give wrong results when spaces between the vehicles on the road are very small (i.e. two cars very close to each other may be counted as one vehicle).

In this paper we are going to propose a methodology for determining traffic congestion on roads using image processing techniques and a model for controlling traffic signals based on information received from images of vehicle present on the roads taken by video camera. In a video frame instead of calculating number of vehicle we are going to calculate the area occupied by the vehicle on the road in the terms of pixels. Variable traffic cycle and weighted time these two parameters are considered for each road based on density of vehicle and sequence of control traffic lights.

II. LITERATURE SURVEY

Md. Munir Hasan, Gobinda Saha, Aminul Hoque and Md. Badruddoja Majumde , In this paper they propose a method for determining traffic congestion on roads using image processing techniques and a model for controlling traffic signals based on information received from images of roads taken by video camera. They extract traffic density which corresponds to total area occupied by vehicles on the road in terms of total amount of pixels in a video frame instead of calculating number of vehicles. They set two parameters as output, variable traffic cycle and weighted time for each road based on traffic density and control traffic lights in a sequential manner.

Prashant Jadhav, Pratiksha Kelkar, Kunal Patil, and Snehal Thorat, The fact is that, the population of city and numbers of vehicles on the road are increasing day by day. With increasing urban population and hence the number of vehicles, need of controlling streets, highways and roads is major issue. The main reason behind today's traffic problem is the techniques that are used for traffic management. Today's traffic management system has no emphasis on live traffic scenario, which leads to inefficient traffic management systems. This project has been implemented by using the Mat lab software and it aims to prevent heavy traffic congestion. Moreover, for implementing this project Image processing technique is used.

Vismay Pandit, Jinesh Doshi, Dhruv Mehta, Ashay Mhatre and Abhilash Janardhan, The simplest way for controlling a traffic light uses timer for each phase. Another way is to use.Electronic sensors in order to detect vehicles, and produce signal that cycles. We propose a system for controlling the traffic light by image processing. The system will detect Vehicles through images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light.

Omkar Ramdas Gaikwad, Anil Vishwasrao, Prof. Kanchan Pujari, Tejas Talathi The main reason behind today's traffic problem is the techniques that are used for traffic management. Today's traffic management system has no emphasis on live traffic scenario, which leads to inefficient traffic management systems. These traffic timers just show the preset time. This is like using open loop system. If we incorporate a closed loop system using camera, it is possible to predict the exact time on traffic light timers. If the traffic light timers are showing correct time to regulate the traffic, then the time wasted on unwanted green signals (green signal, when there is no traffic) will be saved. Timer for every lane is the simplest way to control traffic. And if those timers are predicting exact time then automatically the system will be more efficient. This paper represents the project that has been implemented by using the Matlab software and it aims to prevent heavy traffic congestion. This project does not actually measure the number of vehicles present on the road, but measures the area covered by vehicles on the road

A web camera is placed in a traffic lane that will capture images of the road on which we want to control traffic. Then these images are efficiently processed to know the traffic density. According to the processed data from Matlab, the controller will send the command to the timer to show particular time on the signal to manage traffic.

III. METHODOLOGY

A. Pre-Processing

Pre-processing is a technique used to convert RGB color to gray color image. It is done by using luminance converter shown in below equation.

$$Is=0.2896*IR+0.5870*IG+0.1140*IB$$

Is the grey level image IR, IG, IB are the luminance in red, luminance in green and luminance in blue.

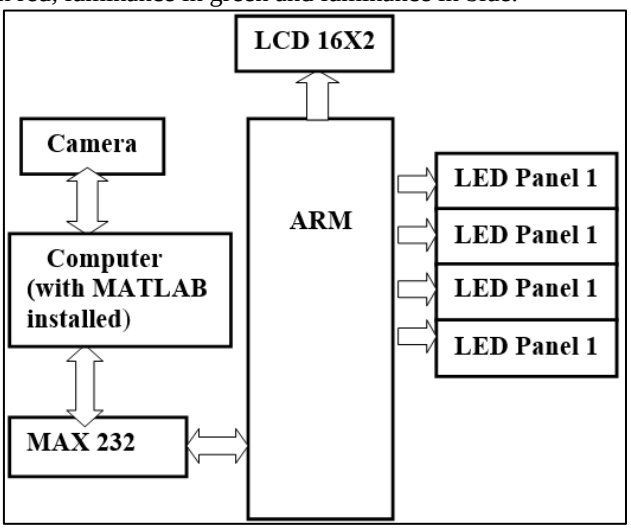

Fig. 1: Block Diagram

B. Image Enhancement

Better contrast and detailed image are provided by enhancing an image compare to a non-enhanced one. Some of image enhancement techniques are power-law Transformation, linear method and Logarithmic method. Among them, power law transformation method is best approach which has the basic formula as shown below: $V = K v\gamma$ Where V and v are I/O gray levels, γ & K is a positive constant (K=1). Therefore, deciding an accurate utility of γ can play a pretentious action in image heighten process. For attain a Gamma correction, the association.

Between light input and output signals must be taken. This is done by the following equation

$$S (0) =K. (e) (E)$$

S (0) = K. (e) (E) is output gain and K is the exposure time that is related to intensity and linear vehicles.

C. Object Detection

Edges of an image correspond to object boundaries. These edges are nothing but pixels where the change in brightness may occur and is calculated the behavior of image function in a neighboring pixel.

D. Edge Detection

It is an image processing technique for finding the boundaries of object within image**.** In the detection unit we

Detect the edges of image in to two parts that is background and foreground image

1) After edge detection we get two images foreground and background image, by subtracting two images we get foreground object and background object [13].
2) To reduce the additive noise and blurring effect which added by the processing of subtraction we use wiener filter.

E. Morphological Operation

There are two types of morphological operation first is morphological opening and morphological closing. In this project we perform morphological image closing to remove small holes within an image.

1) To fill the holes in the objects with closed contours we perform flood fill operation [6]. We get solid foreground image.
2) Now we convert gray scale image to binary image.

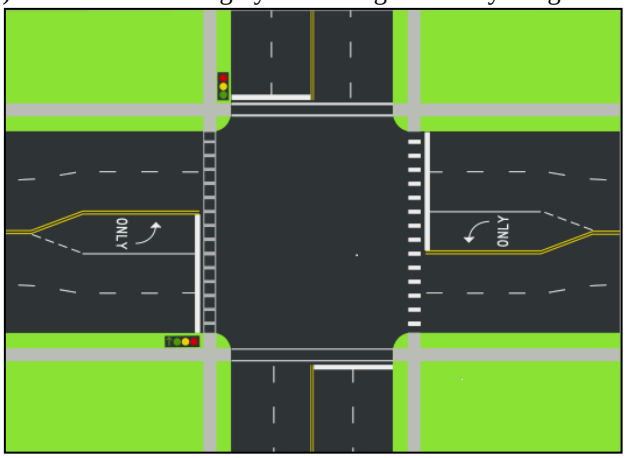

Fig. 2: Street Intersection

IV. CONCLUSION

In this paper, the image captured by the camera from the road and after that captured videos are arranged in serial image. The number of cars has been counted by processing on the each captured image. By setting the threshold value the number of cars exceeds the threshold value the heavy traffic will be shown automatically. The advantages of this new method include such as use of image processing over sensors, low cost, easy setup and relatively good accuracy and speed. Because this method has been implemented using Image Processing and MATLAB software, production costs are low while achieving high speed and accuracy.

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