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REAL TIME TRAFFIC CONTROL SYSTEM USING IMAGE PROCESSING

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Abstract:

Traffic is the major problem which every country faces because of the increase in number of vehicles throughout the world, particularly in large urban areas. Therefore, the need arises for simulating and optimizing traffic control algorithms to better accommodate this increasing demand. One of the ways to overcome traffic problems in large cities is through the development of an intelligent traffic control system which is based on the measurement of traffic density on the road. In this paper we presented techniques with which this problem of traffic is solved. We discussed morphological edge detection to solve this problem. For intelligent traffic light system, the most common technique is the use of fuzzy logic controller. Traditionally a fixed time controller is used which has certain disadvantages. They have predefined cyclic time which schedules off-line on a central computer based on average traffic conditions. Due to this there is wastage of time by a green light for same time on a less congested road as compare to more congested road, so to overcome this problem, the morphological edge detection method is proposed which is based on the measurement of the traffic density.

Keywords: Traffic, vehicles, morphological edge detection, fuzzy logic, traffic density.

INTRODUCTION

As the population of the modern cities is increasing day by day due to which vehicular travel is increasing which lead to congestion problem. Traffic congestion has been causing many critical problems and challenges in the major and most populated cities. Due to this traffic congestion, there Is more wastage of time. The steady increase in the number of automobiles on the road has amplified the importance of managing traffic flow efficiently to optimize utilization of existing road capacity. High fuel cost and environmental concerns also provide important incentives for minimizing traffic delays. So, there is a need of proper control of traffic signal

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timing sequence. Various sensors have been employed to estimate traffic parameters for updating traffic information.

LITERATURE SURVEY/ EXISTING SYSTEM

In digital and green city initiatives, smart mobility is a key aspect of developing smart cities and it is important for built-up areas worldwide. Double-parking and busy roadside activities such as frequent loading and unloading of trucks have a negative impact on traffic situations, especially in cities with high transportation density. Hence, a real-time internet of things (IoT)-based system for surveillance of roadside loading and unloading bays is needed. In this a fully integrated solution is developed by equipping high-definition smart cameras with wireless communication for traffic surveillance. Henceforth, this system is referred to as a computer vision-based roadside occupation surveillance system (CVROSS). Through a vision-based network, real-time roadside traffic images, such as images of loading or unloading activities, are captured automatically. By making use of the collected data, decision support on roadside occupancy and vacancy can be evaluated by means of fuzzy logic and visualized for users, thus enhancing the transparency of road side activities. The CVROSS was designed and tested in Hong Kong to validate the accuracy of parking-gap estimation and system performance, aiming at facilitating traffic and fleet management for smart mobility.

PROPOSED SYSTEM

There is technique which is used for the traffic light control based on image processing which measure the traffic density on the road and according to the traffic density measurements, it decides the cyclic time of the traffic light signals. This also overcomes the problem of expensive sensors because in this technique a high-quality camera has been used for intelligent traffic light control.

- Image acquisition, in which empty road and image with traffic on road is captured; empty road image is saved as a reference image.
- RGB to gray conversion of both the images
- Image enhancement
- Image matching using Morphological edge detection, which matches the edges of the reference image and the image with traffic on road.

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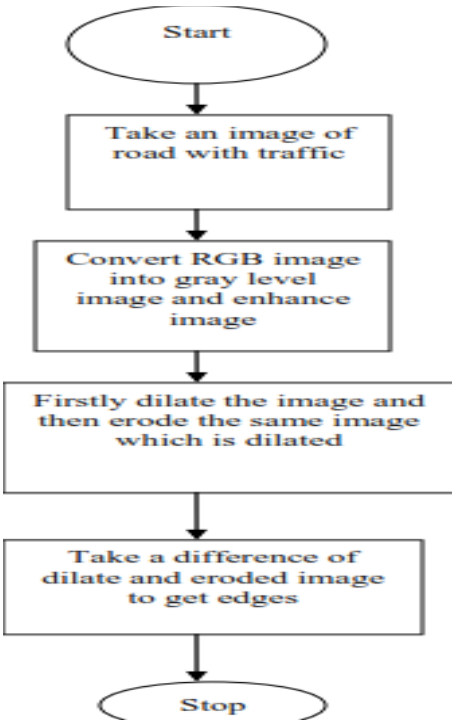

FIG:1 flow design of proposed system

In this paper, the implementation of fuzzy logic controller for the traffic flow control is discussed. Fuzzy logic technology has the capability of mimicking the human intelligence for controlling the traffic flow. It allows the implementation of real-life rules similar to the way in which humans would think. Fuzzy logic traffic lights control is an alternative to conventional traffic lights control which can be used for a wider array of traffic patterns at an intersection. A fuzzy logic-controlled traffic light uses sensors that count cars instead of proximity sensors which only indicate the presence of cars. As the traffic distributions fluctuate, the fuzzy controller can change the signal light accordingly.

1. Traffic from north, south, east, west, from north to west, south to east, west to south and east to north is allowed
2. Right turns are considered
3. Two fuzzy inputs are used: the weight of the traffic on the arrival side(Arrival) and weight of traffic on the queuing side (Queue). If the north and south side is green then this would be the arrival side while the west and east side would be considered as the queuing side, and vice-versa.
4. Signal time is already predefined in the controller based on average traffic condition; extension of the green light is done over already determined time.

Thus, based on the current traffic conditions the fuzzy rules can be formulated so that the output of the fuzzy controller will extend or not the current green light time. If there is no extension of the current green time, the state of the traffic lights will immediately change to another state, allowing the traffic from the alternate phase to flow

RESULTSAND DISCUSSIONS

This section describes the simulation results that have been tested with various traffic images. All the experiments have been done in MATLAB 2014a version

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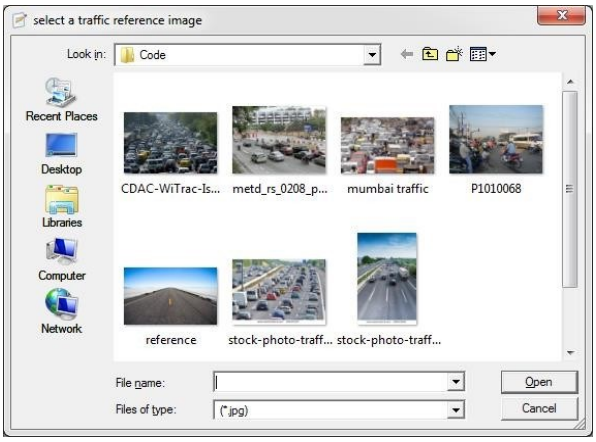

FIG:2 Select a reference image

After clicking on run in MATLAB, a pop-up window appears on the screen, now select a reference image which should be a empty road and click on open. Then the reference image will be selected.

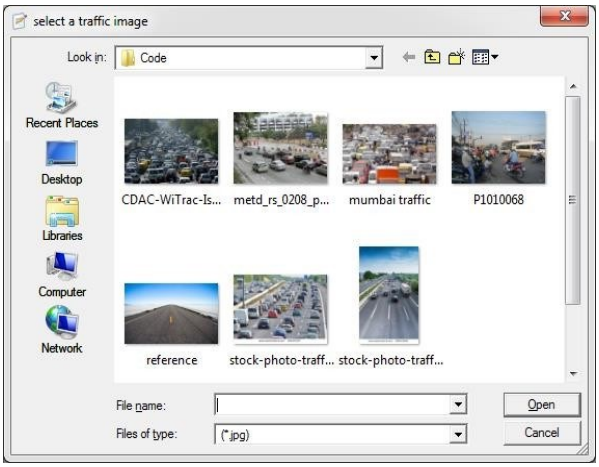

FIG:3 select a real time traffic image

After selecting the reference image then the pop-up again appears on the screen, now select a real time traffic image and click on open. The traffic image will be selected.

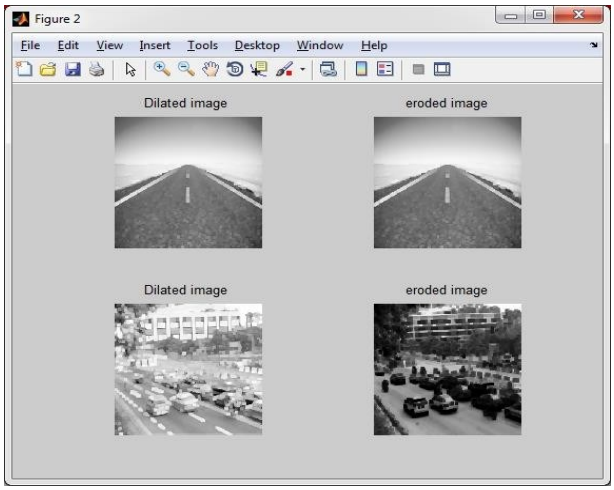

FIG: 4 Morphological processed images

Morphological operations like dilation and erosion are performed on both the reference and traffic images. Then the dilated and eroded images are displayed on the screen.

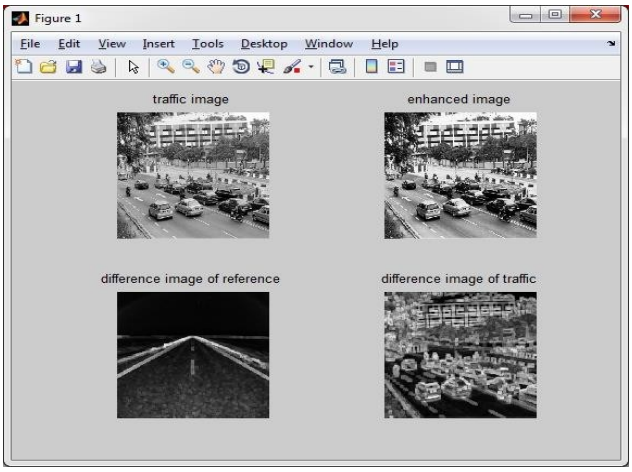

FIG: 5 Enhanced and difference images after morphing

Histogram equalization is performed on the traffic image so, to improve the contrast of image and the enhanced image is displayed on the screen. The eroded image is subtracted from the dilated image and the resulted image

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is known as difference image. The subtraction is done to obtain the edges of objects in the image.

The difference images of both reference and traffic images are matched by using statistical parameters. Based on the matching percentage, the given timing condition for traffic light will be displayed by a message box.

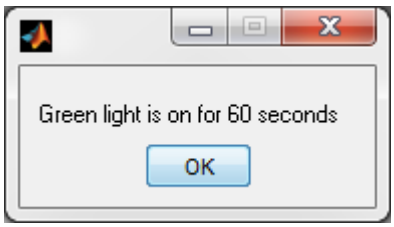

FIG:6 message box to display number of seconds

Repeat the steps for all the directions,

Based on the matching percentage the result will be shown in message box.

Matching percentage on side red as follows:

1. As the matching percentage is between 10 to 50%, it means the traffic is in moderate level, then the green light will be on for 60 seconds.
2. If the matching percentage is between 0 to 10%, it means that there is heavy traffic and the green light will be on for 90 seconds.
3. If the matching percent age is between 70 to 90%, it means that there is less traffic and the green light will be on for 20 seconds.
4. If no vehicle is present RED light will be on for 60 seconds

CONCLUSION

In this project, a method for estimating the traffic using Image Processing is presented. This is done by using the camera which is fixed to the traffic light that captures real time traffic images. Each image is processed separately and the vehicle density has been counted and compared with the reference image. It can reduce the traffic congestion and avoids the time being wasted by a green light on an empty road. The major advantage of this system is that it is flexible as it adjusts the timing of traffic lights according to the actual road condition and 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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