TRAFFIC ANALYSIS AND TRAFFIC LIGHT CONTROL SYSTEM USING IMAGE PROCESSING

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ABSTRACT

Due to the increase in the number of vehicles, traffic congestions and traffic jams are very common. One method to overcome the traffic problem is to develop an intelligent traffic control system which is based on the measurement of traffic count on the road using real time video and image processing techniques. In this project we control the traffic by determining the traffic count on each side of the road and control the traffic signal intelligently by using the count information. Today's traffic management system has no emphasis on live traffic scenario, which leads to inefficient traffic management systems. These traffic timers only show the preset time. This is like using open loop system. If we develop 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 (that is green signal, when there is no traffic) will be saved. Timer for every lane is the simplest way to control traffic. And if the timers are predicting exact time then automatically the system will be more efficient. Our paper represents the project that has been implemented by using the MATLAB software for controlling the traffic. A web camera is placed in a traffic lane that will capture images of the vehicles on the road and then counting of vehicle is done. According to the count from MATLAB we control the traffic signals.

Key words: MATLAB, Image processing, foreground detection.

I. INTRODUCTION

Automatic traffic light can be controlled by timers and electrical sensors. As timer value changes lights are automatically getting ON and OFF. By using electrical sensors it will capture the availability of the vehicle and signals on each phase, depending on this signal the lights automatically switch ON and OFF. Traffic light uses timer is used for each phase in automatic traffic controlling,. Another way is to use electronic sensors in order to detect vehicles, and produce signal. Due to this method the time is being wasted by a green light on an empty road. Traffic congestion may be occurred while using the electronic sensors for controlling the traffic on road.

Need for Image Processing in Traffic Light Control:

We develop a system for controlling the traffic light by using image processing. The system will detect vehicles through images instead of using electronic sensors. A camera will be installed alongside the traffic light. This camera will capture image sequences. Image processing is a better technique to control the state change of the traffic light. It shows that it can reduce the traffic congestion and also avoids the time which is being wasted by a green light on an empty road. It is also more consistent or accurate in detecting presence of vehicle because it uses actual traffic images.

II. BLOCK DIAGRAM

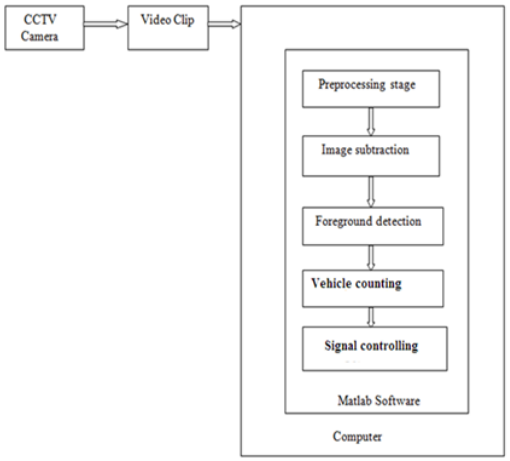

Fig.1 Block diagram

BLOC K DIAGRAM DESCRIPTION

Preprocessing stage (median filtering)

One of the most important stages in image processing is the noise filtering. The importance of image sequence processing is constantly growing with increasing use of digital television and video systems in consumer, commercial, medical, and communicational applications. To improve the image quality Image filtering is used and also it is used as a preprocessing stage in many applications including image encoding, pattern recognition, image compression and target tracking. This preprocessing stage is essential in most of the image-processing algorithm and improper noise filtering may result in inaccurate or even false outcome. We also use median filter in post processing stage after foreground detection.

RGB to Gray Conversion

In photography a grayscale or grayscale digital image is an image in which the value of each pixel is a single sample, that is, it carries only intensity information. Images of this type, also known as black-and-white image. Which is composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest intensity. Grayscale images are different from one-bit bi-tonal black-and-white images, which in the context of computer imaging are images with only the two colors, black, and white (it is also called bilevelor binary images).

Fig.2 Original image

Fig.3 Grayscale image

Background Subtraction

A general tracking concept is to extract salient regions from the given video clip using a learned background modelling technique. This technique involves subtracting each and every image from the background scene and thresholding the resultant difference image to determine the foreground image. Stationary pixels are identified and processed to construct image which we referred as the background registered image. Here we use the fact that the vehicle is a group of pixels which move in a coherent manner, either as a darker region over a lighter background or vice versa. The vehicle may be of the same colour as that of background, or may be some portion of it may be camouflaged with the background due to which tracking the object becomes difficult. This leads to an erroneous or incorrect vehicle count.

Fig.4 Background subtraction

Foreground detection

Detecting information can be used to identify the vehicle type and also to correct errors which are caused due to occlusions of two vehicles. After registering the objects the background image is subtracted from the video frames to obtain the foreground objects. Post processing stage is performed on the foreground objects to reduce the noise interference.

Dilation

In this method, if any pixel of the rectangle fits at or under the image intensity profile, the center pixel of the rectangle is given the maximum intensity of the pixel and its two neighbors in the original image; otherwise the pixel is set to zero intensity.

Vehicle Counting

The tracked binary images forms the input image for counting. This images is scanned from top to bottom for detecting the presence of an object. Two variables are used for counting i.e., count and count register counter.Count that keeps track of the number of vehicles and count register counter, which contains the information of the registered object. When a new object is encountered first check to see whether it is already registered in the buffer, if the object is not registered then it is assumed to be a new object and count is incremented and if it is already registered count does not increment and the presence of the object is neglected

This method is applied for the entire image and the final count of objects is present in variable count. A good accuracy of count is achieved. Sometimes due to occlusions two objects are merged together and these objects are treated as a single entity.

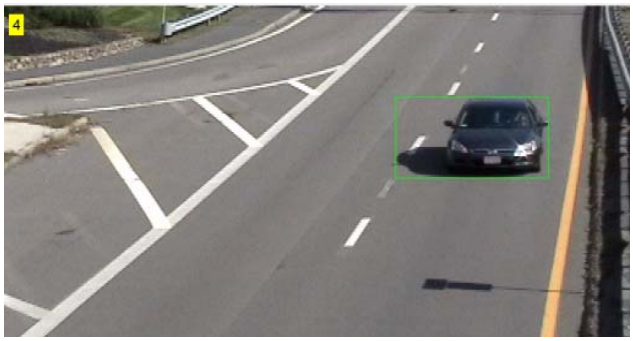

Fig.5 Vehicle counting

Signal controlling

For controlling the traffic light initially only one signal is green and others signals are red. Camera at each lane captures images and according to vehicle in images count is registered. After completion of specified time duration first signal will getting red and its count is reset to zero. Then comparison between count variable is done and according to result the signal having highest count will be green and this process is continue.

CONCLUSION

The above paper presents the controlling of traffic light by using image processing. The earlier techniques had a drawback of time being wasted on green light on the empty road. Our implemented system avoids this problem. We have successfully implemented real time image processing based on traffic light controller

This paper illustrates that the image processing is the best way to control the traffic when it comes to real time feedback. The most important feature of this paper is that it removes the need of hardware sensors like infrared sensors and RFID tags.

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