IOSR Journal of Electronics and Communication Engineering (IOSR-JECE)
e-ISSN: 2278-2834,p- ISSN: 2278-8735.Volume 11, Issue 3, Ver. III (May-Jun .2016), PP 31-34
www.iosrjournals.org

Intelligent Traffic Management for Metropolitan Cities Using Image Processing

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Abstract: *Traffic is the major problem which country faces today this is because of the increase in number of vehicles. The increase in number of vehicles resulting to the need of a smart system that could efficiently handle traffic congestion based on the density of traffic. This paper discusses about some of the existing traffic light control system and their drawback and image processing technique i.e. Threshold technique that helps in finding traffic density.*

Keywords: *Image Processing, Intelligent Traffic System, Traffic density, Electronic sensors*

I. Introduction

As we know the population of city and number of cars is increasing day by day. With increasing urban population and hence the number of cars, need of controlling streets, highways and roads is vital. Existing traffic control system are manual controlling and automatic controlling. In manual controlling it require man power to control the traffic. Since the strength of traffic police is poor it is not possible control traffic manually in all area of a city or town. In automatic traffic 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 to this method the time is being wasted by a green light on an empty road. Traffic congestion also occurred while using the electronic sensors for controlling the traffic. In this paper, a system that estimates the size of traffic in highways by using image processing has been proposed and as a result a message is shown to inform the number of cars in highway. This model has been implemented by using the Matlab software and it aims to prevent heavy traffic in highways. Digital image processing is meant for processing digital computer. It is the use of computer algorithm to perform image processing on digital images. It is a technology widely used for digital image operations like feature extraction, pattern recognition, segmentation, image morphology etc. we are using threshold technique. There are two types of technique (1)-manual thresholding (2)-automatic thresholding. In this model we are using automatic thresholding.

II. Our Proposed Method

The model consists of different parts below is the description:

- IMAGE ACQUISITION (CAMERA)
- IMAGE PROCESSING
- DECISION MAKING
- INTERFACING

- **Image Acquisition (Camera):**

- Images are captured by camera (webcam).
- The pixel values typically correspond to light intensity in one or several spectral bands (gray images or color images).

- **Image Processing:**

- Image processing is any form of signal processing for which the input is an image, such as photographs or frames of video and the output of image processing can be either an image or a set of characteristics or parameters related to the image.

Image Processing is used to:

- Convert RGB image into GRAY image.
- Filter noise and retain useful information from the acquired image
- Improve the processing speed by decreasing the volume of data in the image
- It includes two categories: Segmentation and Feature Extraction

- Segmentation techniques are intended to define and separate regions of interest within the image. Two of the common segmentation techniques are thresh holding and edge detection.

- Threshold involves the conversion of each pixel intensity level into a binary value, representing either white or black. This is done by comparing the intensity value of each pixel with defined threshold value.

➢ **Decision Making**

Decision making is done by image segmentation method thresholding. Thresholding is an operation in which a grayscale image is converted to a binary image. The conversion to a binary image is done by changing all the pixels with a grey level under the threshold level to 0 (black) and all over or equal to the threshold level to 255 (white).). The threshold level can be found by mathematical methods or by setting it manually by studying the image and the histogram for the image but here we are using automatic thresholding which is a mathematical operation in which the threshold level is found by mathematical operations.

Commands and functions present in MATLAB for performing thresholding are

>> **level=graythresh(imGRAY);**
>> imBW = im2bw(imGRAY,level);
>> figure, imshow(imBW);

This function converts pixel intensities between 0 to *level* to zero intensity (black) and between *level+1* to 255 to maximum (white).

Low Traffic Density

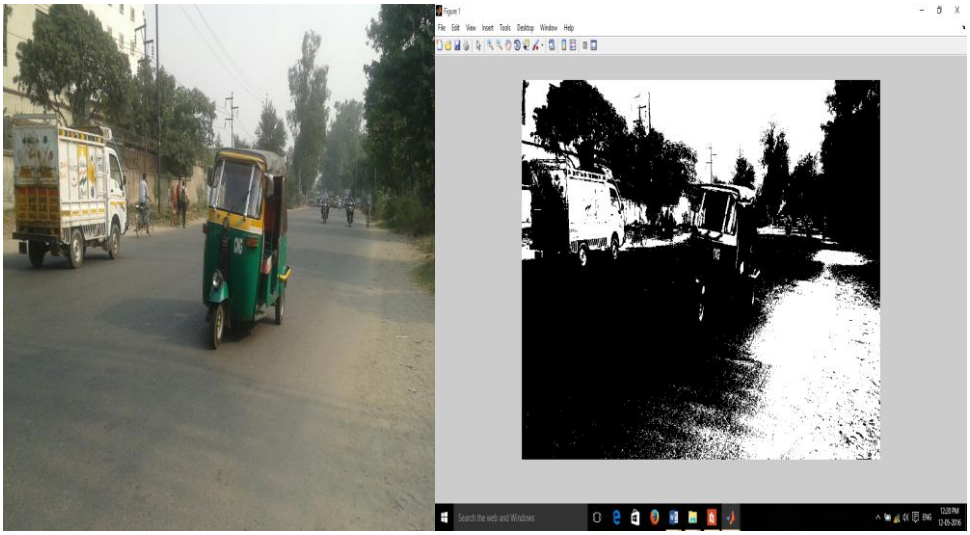
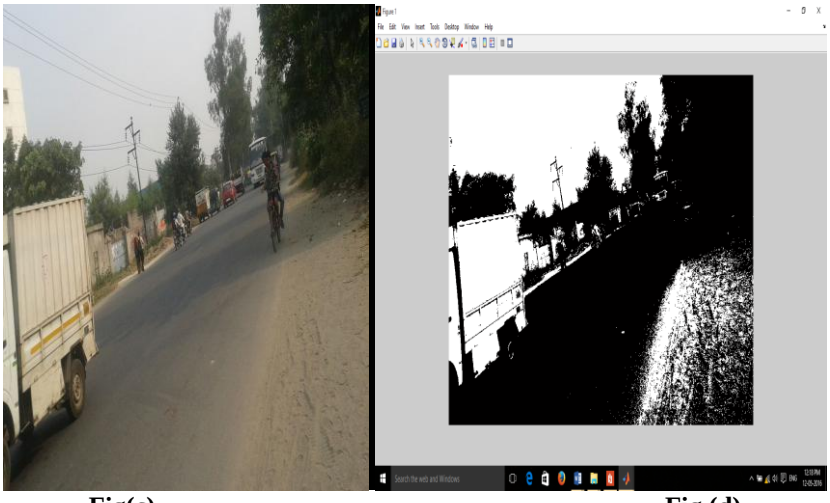


Fig.(a) **Fig.(b)**

Fig. (a) Original Intensity Image (b) Binary Image

High Traffic Density



Fig(c) **Fig (d)**

Comparison of various edge detection techniques

Fig (e) Original image

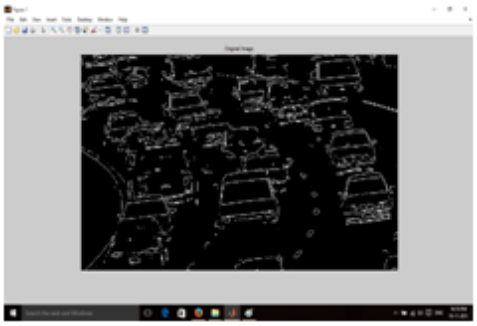


Fig (f) Prewitt

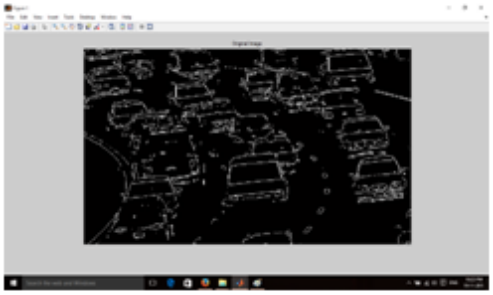


Fig (g) Sobel

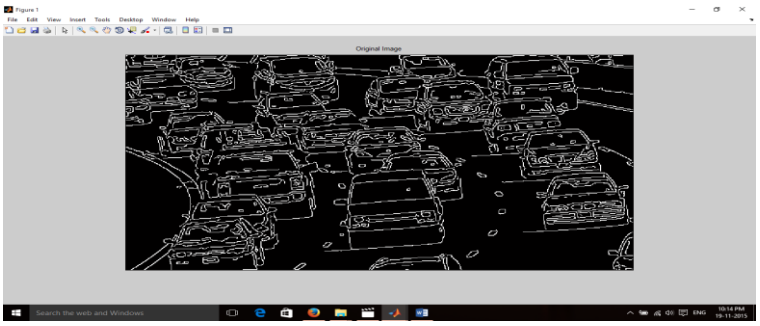


Fig (h) Canny

III. Result

DETECTION TECHNIQUE	NO OF OBJECTS	NO OF OBJECTS DETECTED	ACCURACY
PREWITT	21	13	61
SOBEL	21	12	57
CANNY	21	20	95

IV. Conclusion

In this paper, a method for estimating the traffic using Image Processing is presented. This is done by using the camera images captured from the highway and videos taken are converted to the image sequences. Each image is processed separately and the number of cars has been counted. If the number of cars exceeds a specific threshold, warning of heavy traffic will be shown automatically. The advantages of this new method include such benefits as: 1) Non-use of sensors 2) Low cost and 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. In this respect, the method is superior to previously published designs. The method presented in this paper is simple and there is no need to use sensors that have been commonly used to detect traffic in the past. However, one of the most important disadvantages of this

method is extreme sensitivity to light. For example, when installed in the road, changes in sun light potentially cause interference with the camera. This problem can be overcome by using specific filters during Image Processing or changes in Matlab code. With some improvements, this method can be used to detect road accidents and identify violations of the spiral movements of cars.

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