



SMART DETECTION OF EMERGENCY VEHICLES IN TRAFFIC

Deepa¹, Navya Kumari², Manisha K³, Manu Manjunatha⁴, Kshama shetty⁵

¹Asst professor, ^{1,2,3,4,5}Department of ISE

Abstract

Smart detection of emergency vehicle is a surveillance system which recognizes the emergency vehicles which are stuck in traffic congestion. Due to the fact from past few years the range of vehicles usage of the road is growing each day that results in traffic congestion, for better management of this traffic this system is useful. It is a technology in which computer system to reads the license number plate of vehicle from digital pictures. In this paper we use maximally stable extremal region edge detection algorithm for detection of words from given digital video. The emphasis of this paper is on a method to implement emergency vehicle recognition using MATLAB.

Keywords: Character Recognition, Maximally Stable Extremal Region Edge Detection, Optical Character Recognition, aurdino uno, MatLab.

I. INTRODUCTION

Our developing scientific world is deploying research in transportation systems which have an important role in our lives. Smart detection of emergency vehicle in a traffic system is a technology to detect the emergency vehicles like ambulance in traffic capturing video. The human intervention makes the system very much prone to mistakes so we propose the system which will automatically detect the emergency vehicle in the video after converting into images with the help of image pre-processing activities. It is a system which has lots of applications and challenges. To extract the ambulance region we use edge detection and morphological operation. Results depend on reliability and image clarity and image quality. To make our work easier, we use Matlab for this image processing purpose.

II. LITERATURE SURVEY

Parthasarathi, Surya, Akshay, Murali and Shriram [1], proposed the system of automatic detection of ambulance in traffic using video and image processing in which they used the process of converting the video into frames of images which is implemented in this paper and the ambulance is detected by the siren colour detection.

Saravanan [2], proposed the system of automating the traffic using video surveillance by object recognition and object tracking. This paper presents the simple and efficient morphological operation, image binarization and checking the road density and then letting the traffic free is being implemented. The idea of hardware implantation is also being applied in this paper.

Padmaja, Gantayat [3], The main objective is to use different morphological operations in such a way that the ambulance word can be identified accurately. This is based on various operation such as algorithm application, morphological transformation, edge detection and extraction of words from an video clip. The MSER algorithm is implemented and text localization is achieved.

Mallikharjuna, Santhi, Pavankumar, Rama Rao [4], The emphasis of this paper is on the finding solutions to the traffic related problems. The architecture includes 2 modules: software and hardware module. This paper implements a system that utilizes new technologies for organization and transmission of information for intelligent traffic controlling process.

Andronicus, Maheswaran [5], This paper presents a simple approach to identify the character. After reducing noise from the input image, histogram equalization is used to enhance

the contrast of the binarized image. This paper implements the smart detection of ambulance in the traffic.

III. METHODOLOGY

A. VIDEO AND IMAGE ACQUISITION:

The first step of processing of vision system is the image acquisition stage as shown in fig 1. The image is obtained from the video where this video is converted into frames, after obtaining the input image various image processing is performed. Once the RGB image from the frames of video is obtained it is converted to gray scale, binarization process is performed to the captured image. The obtained image is threshold for further process of identifying words region on the image. *B. Ambulance Detection :*

For a threshold image of a word detection the Ambulance word is detected on the image and a bounding box is drawn around the word detected on every image of frames obtained from the video. The threshold is set such that the bounding box is drawn to more than one word regions and the regions with the one text regions are all removed.



Fig. 1. Original Frame of an Video

C. DETECTING CHARACTERS:

We have used two methods named Maximally Stable Extremal Region (MSER) feature detector algorithm is used as a method of Blob detection in images that finds the difference between image elements from two input images from various viewpoints and this has led to the better object detection algorithm and bounding box technique to mark the possible text region.

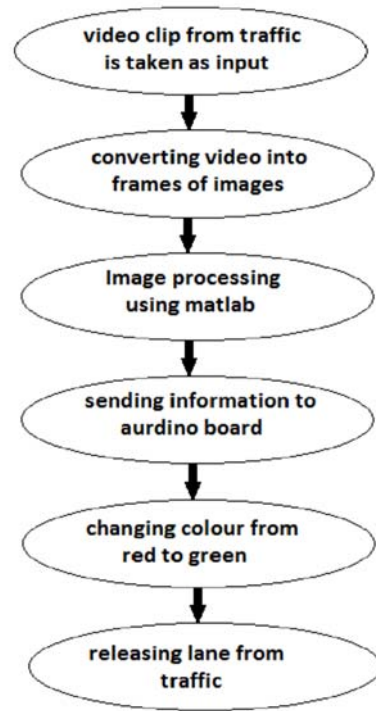


Fig. 2. Flow diagram to control traffic

Bounding box technique: The bounding container is the minimum or the smallest enclosing field that is described as a point S in N dimensions is the box that measure small in phrases of vicinity, volume in higher dimensions within which all the factors lie. Initially a place of 3 X 3 is taken as the scale of the bounding field.

Later the usage of area growing based totally segmentation, the scale of the bounding container will increase, in line with the region of textual content to be had within the photo. We use variable length bounding box which will obtain the complete vicinity of textual content in the image. Based totally on the x and y coordinates the Cartesian product is taken and a field is drawn using minimal and maximal value. A bounding field absolutely specifies the bounds of the corresponding linked component.

D. CHARACTER RECOGNITION:

The character recognition in this smart detection system is done using optical character recognition method which recognises all the characters in the bounding box of frames of image from the video that is taken as an input.

IV. TOOLS

A. Software : MATLAB

Matlab is a software numerical computing environment which allows matrix manipulation

,implementation of image processing algorithms. It is the software that combines a computer environment turned for iterative evaluation and layout techniques with a programming language that express matrix and array mathematics directly.

B. Hardware :Arduino Uno

A Arduino Uno is a microcontroller board on the ATmega328 (datasheet).It has 14 digital input/output pins,6 analog input, a 16 MHz ceramic resonator, a USB connection,a power jack, an ICSP header and a reset button. Arduino Uno implementation is done as an hardware for the traffic signal kind of set up as shown in fig. 9 and other jump wires and LED bulbs and resisters are the some more hardwares are used for implementation.

V. RESULTS AND DISCUSSION

Since there is no benchmark dataset available in the literature, we have taken a variety of videos. The implementation of this experiment is done on various videos.The user inputs the video of the vehicle which is processed to detect the presence of ambulance. The Captured RGB video is flipped and converted into grey scale video as shown in fig. 3 .The noise is removed from the captured image if in case of blur image is inputted by the programmer.

From the original video after the extraction of images the one of the feature of detecting the ambulance is by text and that is being calculated to extract the region of word ambulance from the frames of images and finally gets noticed to the user as the further processing of character detection, the word required is detected.

The text detection approach is done using optical character recognition algorithm based technique and bounding box technique is used for detecting the possible text regions and are further marked.From the final detected regions the text is being read and displayed to the user for the further processing purpose.



Fig. 3. RGB to grey scale conversion

The threshold image as in figure 3 is used for text detection process.In the figure 4 the word ambulance from the original image is being detected using the bounding box technique. Using this technique a rectangular box is drawn around the word required as also shown in fig 5.



Fig. 4. Detection of ambulance in night

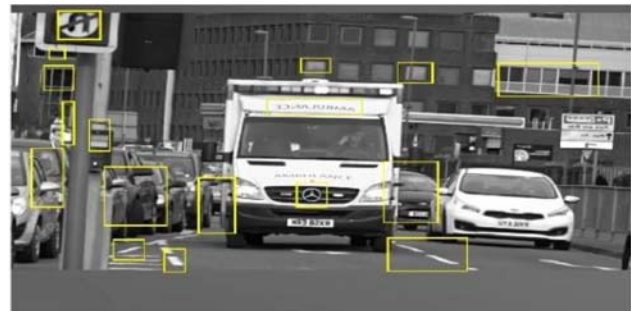


Fig. 5. MSER Technique of applying bounding box



Fig. 6. After flipping detection of word Ambulance



Fig. 7. Detection of characters in an image



Fig. 8. Trails of Detection in different video

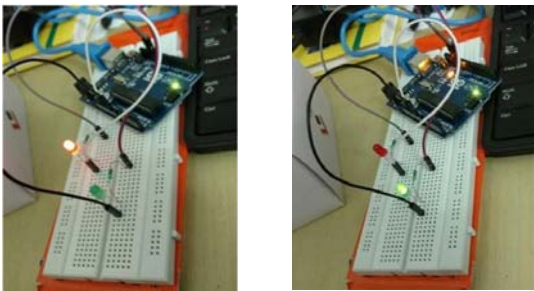


Fig. 9. Hardware Output of changing signal light

The above Fig.4, Fig.5, 6, 7, 8 are the results of ambulance detection. The figure 6, 7 and 8 are the output with different trials. Figure 4 is the output detected from an video in the dark. Figure 7 detects the word ambulance in the heavy traffic along with the disturbance of other vehicles. Figure 9 is the hardware implementation of signal changing from red to green when ambulance is detected.

VI. CONCLUSION AND FUTURE WORK

The objective of this research is to detect and identify the emergency vehicle like ambulance in the traffic from the given video as an input. The system consists of extraction of frames, character segmentation and recognition of characters. The application of this algorithm is being tried on many videos to get the ambulance detected in the video of congested traffic.

Furthermore research can be done to capture an image from a live video and detect the ambulance, as presently as per now done for videos given as an input by the user.

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