

# An Approach for Feature Detection of Moving Object Using Image Mining

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**Abstract.** Every object has features like color, shape, texture and so on. But when we concentrate some specific object then there are some more special feature for that objects for example a vehicle has number plates that identify vehicle uniquely and for humane there are eyes that identify humane uniquely. Feature detection of moving object is major research area for the security purposes. It will be a great success for computer vision to uniquely identify the object as humane can. Here we concentrate on moving car and trying to detect number plate and extract the numbers. We start with frame selection for which background subtraction and estimation method has been used. Number plate is detected and the extraction of number plate is performed. Character detection, character extraction and Character recognition techniques have been used to find the numbers on number plate of moving car.

**Keywords:** Object feature, number plate, moving object, computer vision, image mining etc

## 1. Introduction

The feature is defined as a function of one or more measurements, each of which specifies some quantifiable property of an object, and is computed such that it quantifies some significant characteristics of the object. General features of an image are color, shape and texture. Feature calculated at each pixel is color, subdivision of image is shape and entire image is texture. In which shape is most important to identify an object in an image. Edges are used for shape feature extraction.

Moving object detection is used very much for surveillance purposes. It is also the first step for further processing of image mining. There are two methods of detection of moving object, one is using background detection [1] and second one is temporal frame differencing [2]. In background detection algorithm first background is calculated using different method such as Gaussian background estimation; median filter background estimation and so on. While in temporal frame differencing method two consecutive frames are differenced using pixel wise.

Computer vision is the process of making computer able to humane for vision purpose by digitally calculating and understanding an image [3]. It includes image acquiring, image processing, image understanding and producing symbolic information in form of decision [4]. Computer vision is concerned with the theory of artificial systems that extract information from images. Extension of computer vision is image mining.

Image Mining is concerned with pattern extraction, implicit knowledge generation and image data relationship generation, which cannot done only by collection of images [5]. Some of the methods used to gather knowledge are: image retrieval, data mining, image processing and artificial intelligence. These methods allow Image Mining to have two different approaches. First, is to extract only from databases or collections of images, and second, is to mine a combination of associated alphanumeric data and collections of images [6].

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## 2. Our Approach

We want to select a frame when car image is at a proper distance so that its perfect view of number plate. After that number plate is detected and extracted from the frame. After that numbers are detected and segmented. Finally numbers are extracted.

### 2.1. Frame selection

We detect moving object by background estimation and subtraction method. The algorithm used for background estimation is min max algorithm. Three values are estimated for each pixel using the training sequence frame without foreground objects: minimum intensity (Min), maximum intensity (Max), and the maximum intensity difference between consecutive frames (D). For these we have to consider the frame manually in which there are no moving objects and they are used to estimate a background image.

Let we take **M** number of frame for training the background frames. Let **I<sub>n</sub>(x,y)** is the intensity of pixel located at **(x,y)**. Then

$$\begin{aligned} Min &= \min(I_{n-1}(x,y), I_n(x,y)) \\ Max &= \max(I_{n-1}(x,y), I_n(x,y)) \end{aligned} \quad \text{for } (n = 2 \dots M)$$

$$D = \max - \min$$

After background estimation we have to subtract the frame with estimated background either min frame or max frame. Then calculate the difference for each pixel and if the difference is greater than the intensity difference (**D**) for that pixel then it is assumed as a foreground pixel. So the object from the background is finally detected for each frame.

Now length of video is detected let it be **len**. After that difference (**diff**) is calculated for each frame with estimated background. Now check for the foreground pixel **mobj** by apply threshold from intensity difference(**D**).

$$diff = I_n(x,y) - Max(x,y) \quad \text{for } (n = 1 \dots len)$$

$$mobj_n(x,y) = \begin{cases} 1 & \text{for } Diff(x,y) > 0 \\ 0 & \text{elsewhere} \end{cases}$$

$$diff = I_n(x,y) - Min(x,y) \quad \text{for } (n = 1 \dots len)$$

$$mobj_n(x,y) = \begin{cases} 1 & \text{for } Diff(x,y) > D(x,y) \\ 0 & \text{elsewhere} \end{cases}$$

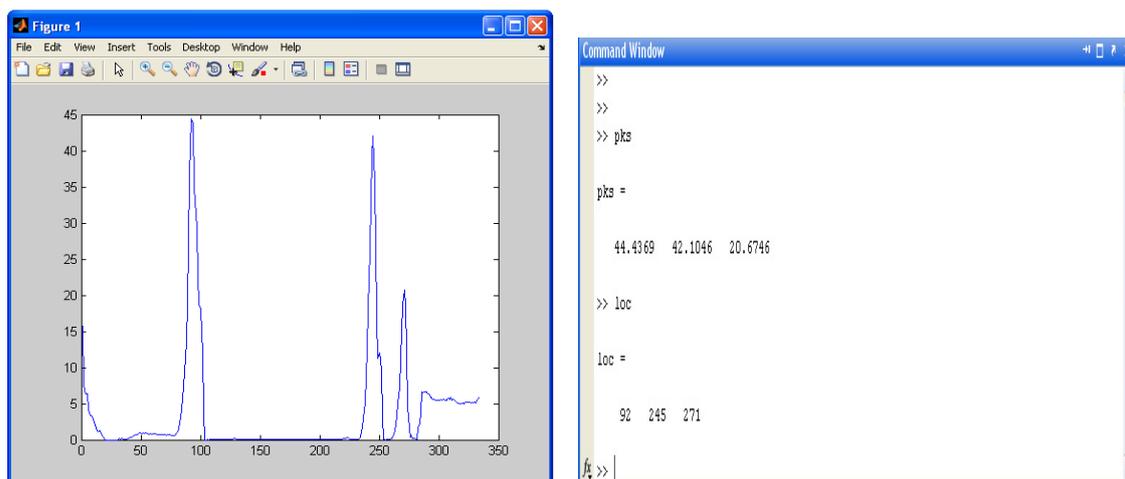
Now we get the moving object in each frame. Now we move forward for frame selection.

We have used means of frame for frame selection. As the view is going to perfect mean of frame value is increased and after that it will again decrease. So means of each frame have been calculated. The mean is the sum of the data points divided by the number of data points. That is,

$$\bar{Y} = \sum_{i=1}^N \frac{Y_i}{N}$$

The mean is that value that is most commonly referred to as the average. We will use the term average as a synonym for the mean and the term typical value to refer generically to measures of location. But for mean of frame this procedure is repeated once more.

Then plot them and finally select the local maxima. A local maximum, also called a relative maximum, is a maximum within some neighborhood that need not be (but may be) a global maximum. We can set the height range of neighbors. We can set the minimum height of maxima. Even we can set distance between two maxima.



The location of local maxima is found. The frame with location number is selected and saved as a frame with perfect view and forwarded for further process of plate localization.

## 2.2. Number Plate Detection

After frame selection the frame is converted to gray. Then contrast stretch operation is performed. After that it is converted into binary image and then performs morphological operation. Using the number of connected component number plate area is detected. For this optimal value of plate ratio, intensity difference, density values are set and according to them coordinates of best connected component are detected.

## 2.3. Number Plate Extraction

The coordinates are used to segment the number plate from the original image. After that its gray conversion is performed. Then skew removing operation is performed. Then the segmented number plate is forwarded for next operation.

## 2.4. Character Detection

The gray color skew less number plate is then further processed to detect character. Threshold is calculated and binary conversion is performed using this threshold. Then morphological operation is performed.

## 2.5. Character Extraction

When the labels of connected components are find then the character are segmented. They are segmented using the coordinate of connected components.

## 2.6. Character Recognition

The final operation and most difficult is character recognition. I use the simple method of template matching with help of correlation value. Then related text is extracted in a notepad.

The correlation is given by

$$r = \frac{\sum_m \sum_n (A_{mn} - \bar{A})(B_{mn} - \bar{B})}{\sqrt{\sum_m \sum_n (A_{mn} - \bar{A})^2 \sum_m \sum_n (B_{mn} - \bar{B})^2}}$$

Where  $\bar{A} = \text{mean2}(A)$ , and  $\bar{B} = \text{mean2}(B)$ .

r is the double scalar value and the select text with maximum r with query image.

## 3. Experiment and Result

All the above steps are performed and the corresponding result is shown. We have used the canon camera to take the picture from the divider of the road. The video is 640x480 pixel. Here shown two consecutive frame 91 and 92 and using them all steps are performed.



[a] Frame 91



[b] Frame 92



[c] Input Image



[d] Gray Input Image



[e] Number Plate



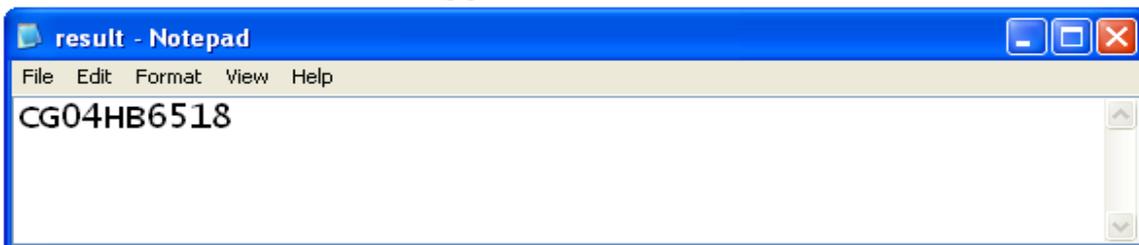
[f] Binary Number Plate



[g] Character Detection



[h] Character Extraction



[i] Character Recognized

#### 4. Conclusion and Future Scope

From the result we can see that the entire three algorithms are sufficient for detection of moving object. In future we can try combined feature like edge and structure, edge and color, or structure and color to detect. They may produce more good result for boundaries of object as here it is distorted.

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