

# Speed Analysis of a Vehicle Based on its License Plate

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**Abstract**— Automatic recognition of vehicle registration plate (license or number plate) plays an important role in a today life. This paper discuss about a software fetching a vehicle license plate automatically from a video. Video may be in the form of color or black and white. Video is in the avi. Format which contains 12 frames per second. To recognize the license plate of vehicle several steps to be followed which includes Edge detection, license plate region localization, character segmentation and character recognition and feature extraction. With the help of license plate speed of vehicle is also calculated in this paper. By directly sending the video information for speed estimation and calculating the frequency of a license plate, speed estimation can be done.

**Key words:** Character recognition, HOT (Histogram of orientated templates) algorithm, SHIFT (Scale invariant feature transform) algorithm, SVM (Support vector Machine) classifier and Speed analysis

## I. INTRODUCTION

Automatic license plate recognition is based on video technique in which license plate of vehicle is recognized by using a software which is processed in a computer system. This is a real time application which access to a toll collection or parking point. In this paper, a camera captures a video of a vehicle which is in color, avi. Format and has 12 frames per second and each frame is of 320\*240 pixels. A license plate can be easily recognized by a human eyes because of high intensity of our eyes but captured in a camera exists many problems like image perspective distortion, poor image quality, to reduce the noise and many others. This paper overcomes such problems and cleared license plate is recognized. This process includes following steps Video acquisition, License plate localization, Character segmentation, and Character recognition and feature extraction. In previous papers by using different techniques and algorithms license plate of vehicle is recognized but in this paper using HOT and SIFT algorithm and SVM training a license plate of vehicle is recognized. Even by the License plate speed of vehicle is recognized. Speed of a vehicle from a given video is processed by calculating the frequency of a license plate. License plate region is given to a frequency of license plate region. In this region, we are going to calculate the size of a characters to detect the speed of a vehicle. If the size of a character becomes smaller very quickly then this indicates vehicle is moving with a high speed. If the size of a character becomes smaller slowly then this indicates vehicle is moving with a low speed. Thus with the help of frequency of a license plate speed of a vehicle is estimated.

[01]This paper is based on Image of vehicle in which extraction of number plate is carried out. The main objective in this paper is the use of Mathematical Morphological operation to extract the number plate accurately. The paper presents Plate location, character separation and character recognition. In character

recognition, low-resolution template matching method is used. [02] This paper presents a survey on existing ALPR techniques. In this paper character recognition is done using template mating or using classifiers like neural networks and Fuzzy classifiers. In this [03] paper, Video of a vehicle is considered. This paper is research of License plate recognition systems of Thai characters under an uncontrolled environment. This[04] paper is based on video technique which is efficient in detecting and extracting registration plate of the vehicle, not only in clear environment but also in foggy and rainy environment. In this paper, MATLAB operations are used to extract a registration plate.

## II. IMPLEMENTATION

### A. Block Diagram

Block diagram is divided into two steps

- a) Training
- b) Testing.

#### 1) License Plate Recognition

In training part, Individual character is processed to pre - processing block. In this block a RGB (Red, Green and Blue) image is converted into Grayscale image. Then feature extraction process is carried out. In feature extraction two algorithms are used HOT and SHIFT. In HOT algorithm, feature is extracted from middle level by comparing with other pixels and that value is written in next matrix. HOT generates a row vector. HOT feature has an illumination invariant property.

$Mag(A) > Mag(A1) \ \&\& \ Mag(A) > Mag(A2) .$

In SHIFT algorithm, extraction of feature collection is processed. SIFT generates a column vector. Extracted features of every character are then forwarded to SVM classifier and trained co-efficient are stored in the knowledge base.

In testing part, actual process begins. Video of a vehicle is captured by a camera. This video generates a 12 frames per second. Consider a single frame in which license plate is clearly visible. As a video is in colored. First it converts a RGB image to Grayscale image. In grayscale pure black and white image is not available. So binarisation process is processed, where a pure black and white is obtained in zeros and ones. Thus license plate region is localized. Further process is character segmentation, process of identifying a single character in different images from plate. Here morphological operation, where dilation and erosion methods are used. Next character recognition process, in each characters of a license plate are recognized. And for these characters feature extraction process undergoes by using SHIFT and HOT algorithm. Then the characters of SVM training and obtained data from Input video are compared and stored in computer screen.

#### 2) Speed Estimation

Query video is directly passed to an video information and stored. To recognize a license plate a video is divided into 12 frames. These frames are passed to frequency of license

plate block where frequency of each frame is calculated. In the meantime, verification of size of object in each frame is also calculated. The characters in the license plate decreases in size in each frame. If it crosses beyond the threshold value then it is declared, the vehicle is 60 speed. If it is within the threshold value then, vehicle is in limited speed (40 speed). This speed estimation is finally displayed on User's screen.

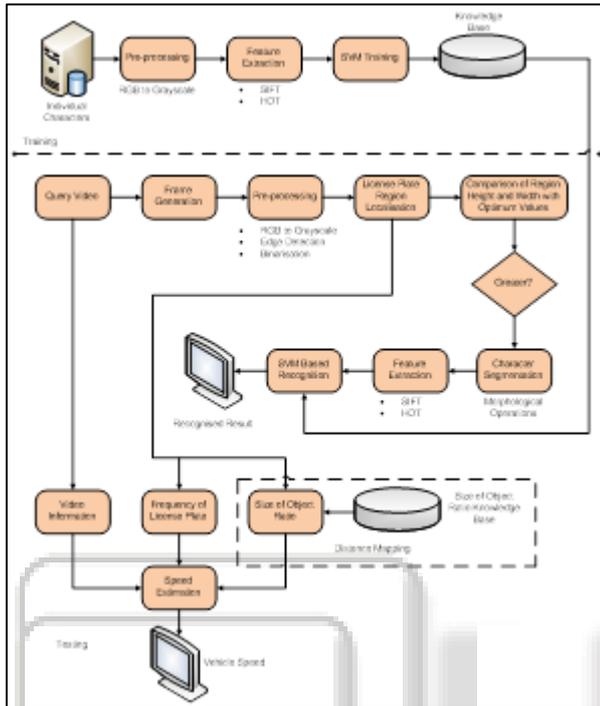


Fig. 1: Architectural block diagram

### III. FLOWCHART

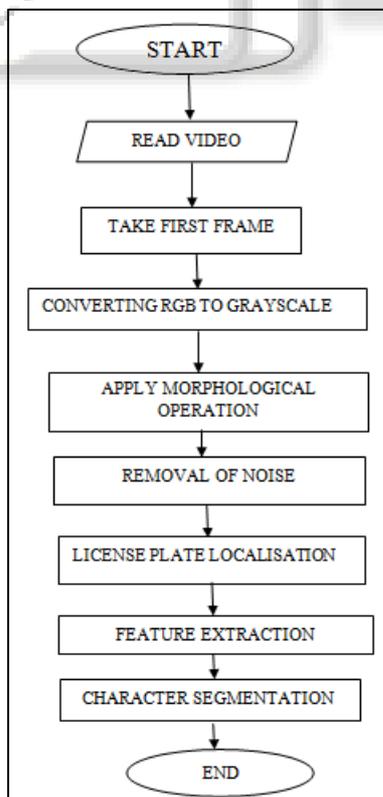


Fig. 2: Flowchart to recognize the number plate

#### A. Read Video

Capturing a video from a Digital camera. The video is in avi. Format. It has 12 frames per second. The original pixel size of each frame is 320\*240 pixels. The video is in color. Consider a first single frame for number plate recognition

#### B. RGB to Grayscale

Preprocessing step is done. Conversion of RGB to GRAYSCALE image is done. RGB define RED, GREEN, BLUE color components for each individual pixels. Grayscale is preferred for image processing format. It maintains Intensities and brightness within the Image.

#### C. Morphological Operation

Morphological method was developed for binary images. The basic morphology operators are Erosion and Dilation. Erosion means removal of pixels to the boundaries of object in an image. Dilation means adding of pixels to the boundaries in an image.

#### D. License Plate Localisation

By following the above steps the License plate is detected.

#### E. Feature Extraction

Feature extraction is done by using Two Algorithms, HOT and SHIFT. Feature collection is processed by using SHIFT algorithm.

#### F. Character Segmentation

Character segmentation is a process of Identifying individual characters. Each individual character are detected from a given frame of video. And sent to SVM classifiers for comparisons of each characters. By using these processes the license plate is recognized. The process begins for all frames to detect the frequency of each frames and thus speed of a vehicle is calculated.

### IV. RESULT

#### A. License Plate Recognition

##### 1) Given Input Video in RGB



Fig. 3: Input video frame.

2) Pure Binarized Image with Noise Eliminated Image



Fig. 4: Noise eliminated image

B. Character Segmentation and Recognition

1) Every Character in a License Plate Is Segmented

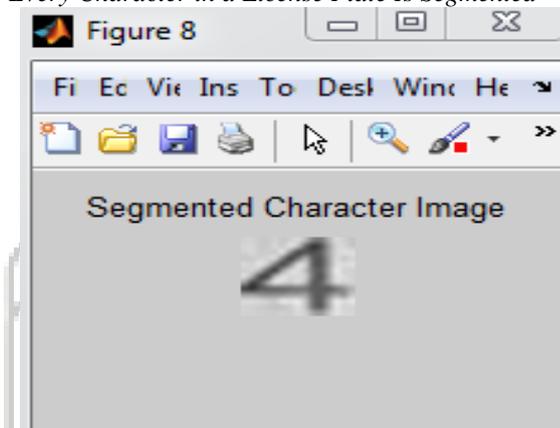


Fig. 5: Segmented Character Image

2) SVM Classified Value

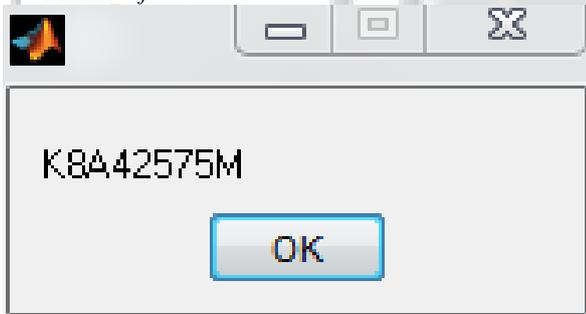


Fig. 6: SVM value

C. Speed Estimation

1) Consider First Video

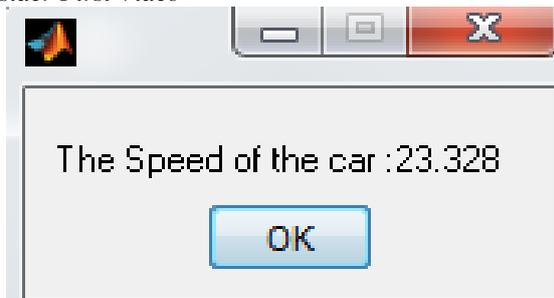


Fig. 7: Speed estimation of first video.

2) Consider Second Video

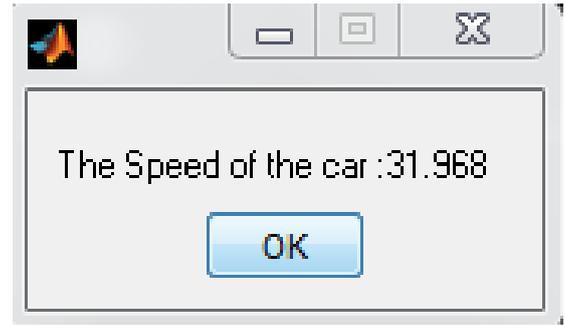


Fig. 8: Speed estimation of second video

V. CONCLUSION

The main goal of this research is to locate the license plate of vehicle from a given video by using various steps including plate location, character segmentation and recognition. This is done by using MATLAB software. And with this there is another application to calculate the speed of vehicle using the video. It was too difficult to detect the license plate in a video. But successfully completed the research. Even this research work on different types of vehicle, on scratched and scaled plate also etc. The future research may be concentrated on night vision camera's. So that even this research works at night also. This application is used in traffic to maintain rules and regulation and even at toll gates.

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