

## **DIGITAL IMAGE PROCESSING OF MYANMAR AUTOMOBILE NUMBER PLATE RECOGNITION USING MATLAB**

Aung Zaw Myint<sup>1</sup>, Aye Aye Thant<sup>2</sup>

### **Abstract**

This paper presents an image processing method for recognizing a Myanmar automobile license number plate. An optical character recognition method is used to read the license plates. The boundary method is applied for characters segmentation. The implementation of the system is simulated on MATLAB software. In this paper, automobile license number plate is detected and segmented successfully.

**Keywords:** Digital image processing, MATLAB software, Image segmentation and recognition.

### **Introduction**

An image is defined as an array or a matrix of square pixels arranged in rows and columns. Image processing is a procedure of converting an image into digital form and carry out some operation on it, in order to get an improved image and to retrieve some important information from the image [Al Faqheri.W and Mashohor.S,2009]. An image processing is a type of signal processing in which input is an image and output may be image or characteristics, features and statistical parameters associated with that image [Kumar .M, 2009]. Image processing can perform core research area within computer engineering, computer science, information systems, information technology, and software engineering which has come to be known collectively as the discipline of computing.

The field of digital image processing has experienced continuous and significant expansion in recent years [Gonzalez.R.C and Woods.R.E, 2002]. Nowadays, Myanmar automobile character plates are required for more advanced improvements in terms of modernized technologies. Myanmar automobile license plate is composed of two lines. The first line represents the division region and the second line represents vehicle numbers. Number plates are used for identification of vehicles all over the nations.

Automobile license plate identification is essential in numerous situations and implementations such as traffic control in unlimited areas, automatic payment of tolls for highways or bridges, general security systems wherever there is the need for distinguishing vehicles [Suresh.P and Suganthi.M, 2014]. In car parking, number plates are automatically recognized and stored in database to calculate duration of the parking.

Automobiles are identifying either manually or automatically. Automobile numbers identification is an image processing technique to identify vehicles of their number plates. Plate localization is accomplished to remove the unwanted background details and focusing on to the essential details in the image. Character extraction is done by segmenting the character portions from the localized number plate. A method has been proposed to remove the frame lines in the number plate followed by digital filtering. A method on image segmentation, region growing and clustering methods are described. Character recognition is an essential application, where the system is put up to deal with distorted characters in the license plate due to hazards.

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<sup>1</sup> Dr, Associate Professor, Department of Physics, Shwebo University

<sup>2</sup> Dr, Pro-Rector, Myitkyina University, Ministry of Education

## **Materials and Method**

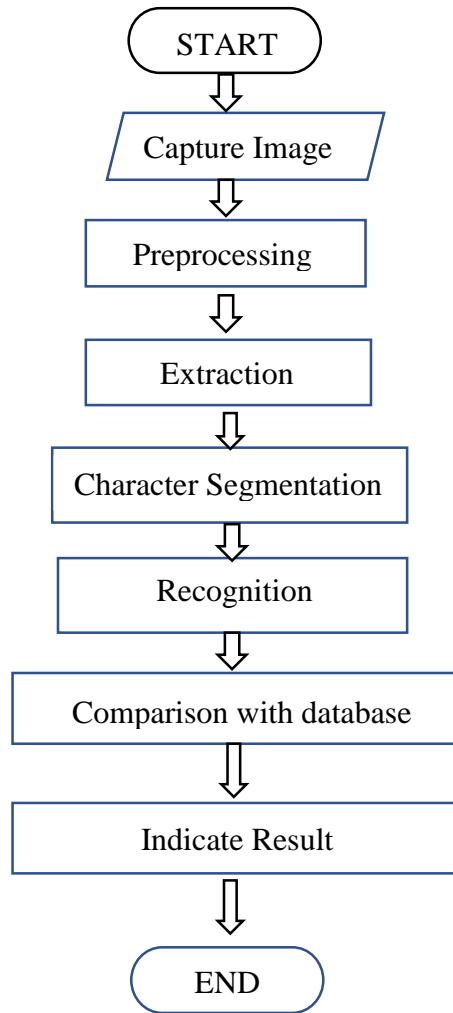
### **MATLAB Software**

The most important part in this process is the software model used in the image processing technology. The programs are implemented in MATLAB. The algorithm is divided into following parts: Capture image, pre-processing, plate region extraction, segmentation of character in the extracted number plate, character recognition, comparison with database and indicate result. The flow chart of license plate recognition system implementation is shown in Figure 1.

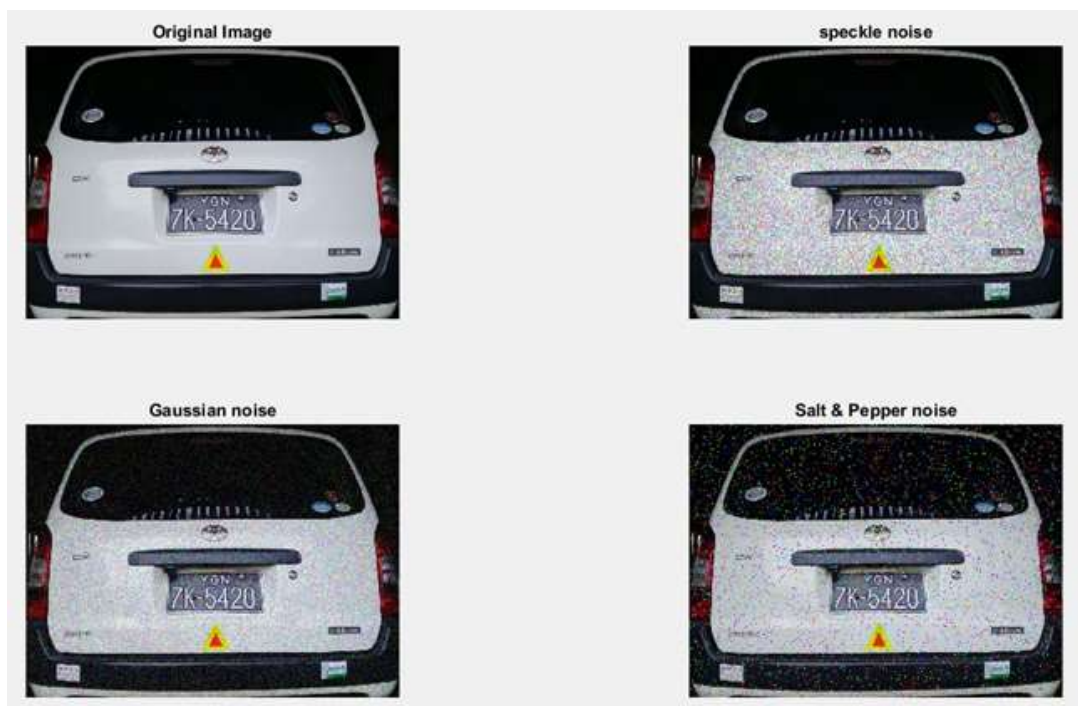
The image is captured by digital camera or webcam. The image captured is stored in JPEG (Joint Photographic Experts Group) format converted in to gray scale image in MATLAB. When the image is captured, there is a lot of disturbances and noises present in the image as shown in Figure 2. In the process, the RGB image is converted to a grayscale image. Grayscale images are obtained from color images. The process alters the color to grayscale by eliminating hue and saturation information. It eliminates unnecessary information and noise. According to the R, G, B value in the image, it calculates the value of gray value and obtains the gray image at the same time. Gray level cannot remove the noises. Media filtering is to remove the noises from the image.

### **Plate Region Extraction**

The extraction of number plate from eroded image is the most important stage. The extraction can be done by using image segmentation method. There are numerous image segmentation methods available in various literatures. The number plate image is filtered and binarized. The set of connected components are segmented to measure the dimensions (height, width and area) of each of these segmented regions.



**Figure 1** The flow chart of automobile number plate recognition system



**Figure 2** Image noises condition of preprocessing

### **Character segmentation**

To extract the characters from the localized number plate, the contents in that image will either be trivial noise components or characters to be identified. Only rectangular segmented regions are taken into data base file. Character segmentation separates each character in the number plate image and then finds the length of the number plate, the correlation and database using labeling components. If both values are same, it will generate the value 0-9 and A – Z. Sobel operators are used to calculate the threshold value that detects high light regions with high edge magnitude and high edge variance.

### **Morphological Operation**

Mathematical morphology method is to detect the edges of the rectangular plate. Mathematical morphology is a part of digital image processing which is concerned with image filtering and geometric analysis by using structuring elements. Structuring element is a characteristic of certain structure and features to measure the shape of an image. The shape and size of the structuring element play an important role in image processing. Structuring elements are used in morphological operations which represent as matrices. The image is processed and changed into set and represents as matrix. The basic mathematical morphological operations namely dilation, erosion, opening, closing is used for detecting, modifying, manipulating the features which present in the images based on their shapes. Dilation and erosion are often used in combination for specific image preprocessing applications such as filling holes or removing small objects. Dilation adds pixels to the boundaries of objects in an image, while erosion removes pixels on object boundaries. After image binarization, morphological operations are performed to remove the unwanted regions.

## **Results and Discussion**

Morphological operations are conducted for number plate localization and the structuring elements are not fixed value. The characters in the upper line of Myanmar license plate are written in smaller font size. This case can be a problem for character recognition stage. Even in the character segmentation stage, some characters in the upper line were disappeared while implementing morphological operations. License plate localization stage may fail in lighting condition. Filters can be used for lighting condition and motion blur.

The vehicle number plate image is measured by using Euler number and bounding box properties Measured characters are segmented by using binary image processing. In this system, the vehicle number plate image is tested and license plate characters are segmented successfully as shown in Figure 3. The characters are converted to string and display in edit box. These characters are stored as text file in this code as shown in Figure 4. The distance between the camera and the vehicle, illumination and orientation are still the challenges for license plate recognition.

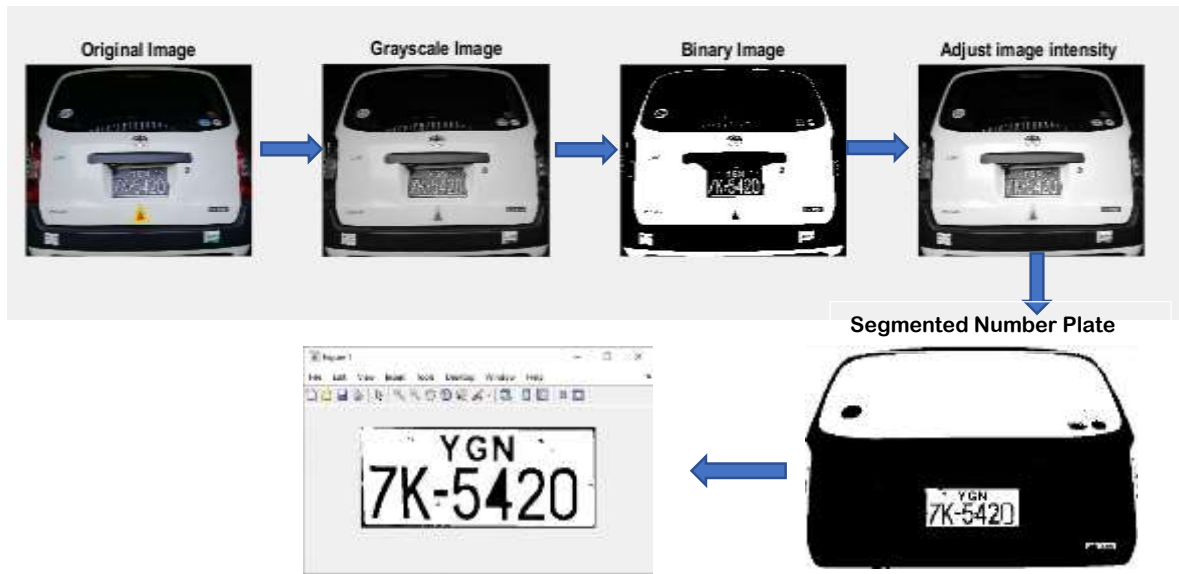


Figure 3 System design for vehicle number plate recognition

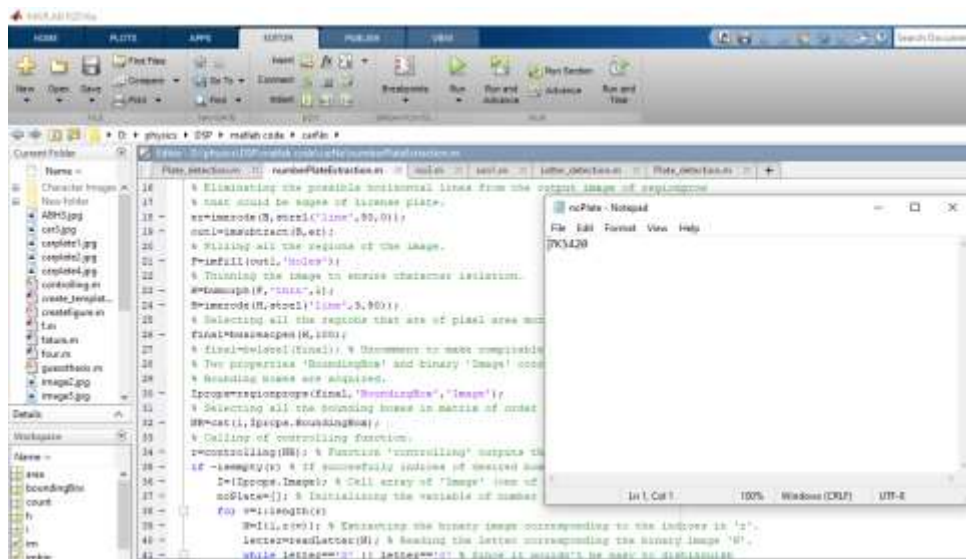


Figure 4 Display of automobile number as text file after recognition

### Conclusion

This work has proposed a method for the detection and identification of automobile number plate. All the letters and numbers are simplified and segmented by using bounding box method in this approach. After segmentation of numbers and characters presented on the number plate, it is recognized the numbers and characters. The experimental results indicate that approach is applicable for the localization and recognition of a Myanmar license plate. The character recognition has been accomplished with the aid of optical characters recognition. According to the types of vehicles, the vertex of the plate from the ground varies depending on the car model. In some cases, the plate is located in the lower-left or lower right part of the vehicle. Besides these displacements of the plate position in the vehicles, the distance between the camera and the vehicles may also vary and then the localization of the number plate captured image plays a very critical role. Automobile numbers identification systems are applicable for the purpose of effective traffic control and security applications. The system in this research is developed based on digital images

and can be simply applied in toll gate, car parking systems for the use of documenting access of parking services, secure usage of parking houses and also to prevent car theft issues.

### Future work

In the future work, to increase the accuracy in classification of the present work, more than one classifier and feature selection techniques can be combined to obtain a better result and to remove the false positives/negatives. Various types of automobile number plate can be classified by using digital image processing technique in the future.

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