Matlab Based Vehicle Number Plate Recognition

Prachi Sontakke[1], Sakshi Shende[2], Vaishnavi Bawane[3], Achal Mule[4], Prof. Sachin Dhawas[5]
Students, Department of Computer Science Engineering[1,2,3,4]
Professor Department f Computer Science Engineering[5]
Rajiv Gandhi College of Engineering Research and Technology, Chandrapur, India

Abstract: *The ANPR (Automatic Number plate Recognition) system is based on image processing technology. It is one of the necessary systems designed to detect the vehicle number plate. In today's world with the increasing number of vehicle day by day it's not possible to manually keep a record of the entire vehicle. With the development of this system it becomes easy to keep a record and use it whenever required. The main objective here is to design an efficient automatic vehicle identification system by using vehicle number plate. The system first would capture the vehicles image as soon as the vehicle reaches the security checking area. The captured images are then extracted by using the segmentation process. Optical character recognition is used to identify the characters. The obtained data is then compared with the data stored in their database. The system is implemented and simulated on MATLAB and performance is tested on real images. This type of system is widely used in Traffic control areas, tolling, parking area.etc. This system is mainly designed for the purpose of security system*

Keywords: Number Plate Recognition, Gray Processing, Image Acquisition, Image Binarization, Template Matching

I. INTRODUCTION

With increasing number of vehicles on roads, it is getting difficult to manually enforce laws and traffic rules for smooth traffic flow. Toll-booths are constructed on freeways, where the car has to stop to pay the toll or parking fees. Also, Traffic Management systems are installed on freeways to check for vehicles moving at speeds not permitted by law. All these processes have a scope of improvement. In the center of all these systems lies a vehicle. In order to automate these processes and make them more effective, a system is required to easily identify a vehicle. Vehicles in each country have a unique license number, which is written on its license plate. This number distinguishes one vehicle from the other, which is useful especially when both are of same make and model. An automated system can be implemented to identify the license plate of a vehicle and extract the characters from the region containing a license plate. The license plate number can be used to retrieve more information about the vehicle and its owner, which can be used for further processing. Such an automated system should be small in size, and portable.Various license plate detection algorithms have been developed in past few years. Each of these algorithms has their own advantages and disadvantages. This project described the method in which license plate is detected usingconfidence related predictions. As multiple detections are available for single license plate, post-processing methods are applied to merge all detected regions. In addition, trackers are used to limit the search region to certain areas in an image. It suggests a different approach of detection using binarization and elimination of unnecessary regions from an image. In this approach, initial image processing and binarization of an image is carried out based on the contrast between characters and background in license plate. After binarizing the image, it is divided into different black and white regions. These regions are passed through elimination stage to get the final region having most probability of containing a number plate

II. STATEMENT OF THE PROBLEM

2.1 License Plate Segmentation

The Recognition system extract license number portion of the plate which is transformed into alphanumeric characters for recognition. Then, these alphanumeric characters are compared to many databases to identify the license number of vehicle of interest. Moroccan License Plate is a way to identify vehicles registered in Morocco. This Registration system date to 2000 which includes a maximum of five-digits followed by two vertical lines. Between the vertical lines,

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-10586

211

ISSN
2581-9429
IJARSCT

there is an Arabic letter referring to the series number. Finally there are one or two digits region code (Prefecture or Province) for the origin of the vehicle. The License plate is usually show black text on a white background, see Fig. 1.
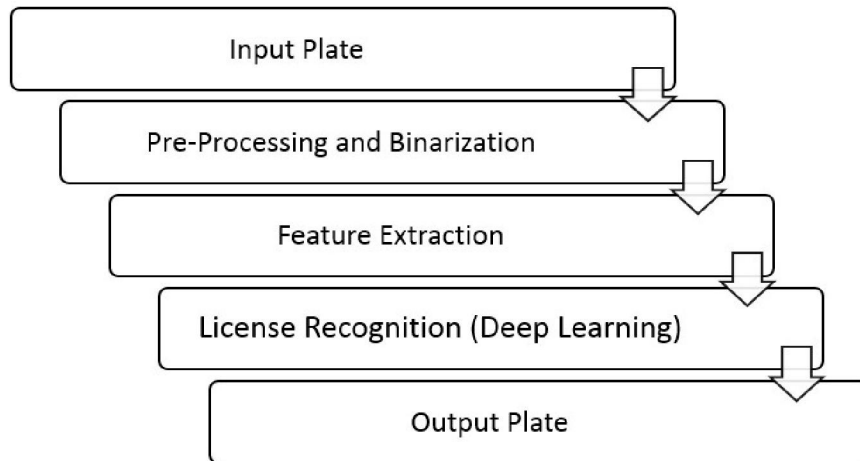
Problem related to Recognition System

There are many problems related to ALPR systems, especially when system try to identify the License plate in the image. Some of them include:

1. *Illumination:* Images Illumination can varies according to outdoor conditions such as rain, headlights lighting, fog etc.
2. *Background:* License plate backgrounds may contain other letters related to state organizations and military corps vehicle. Those License plates are all characterized by a black background and white digit characters, and red letter which can be difficult to separate from the foreground of the image

The recognition system used in this study is presented as the following Fig. 2.

Multiple binarization techniques help to obtain satisfying results in the extraction of Region and license number in the license plate. The extraction of license plate information includes four stages:

- Pre-processing the license plate
- Binarization
- Separation of Region and license number
- Extraction of license plate

Preprocessing is an important step in image processing systems which helps to improve the visual appearance of the license plate and removes noise and distortion. The most important method used to achieve a higher quality segmentation is Histogram equalization, and we used it before some algorithms in binarization step. Indeed, most of studies focus on only one algorithm in binarization step, thus, in this study, we propose a combined binarization algorithm which shows a better result.
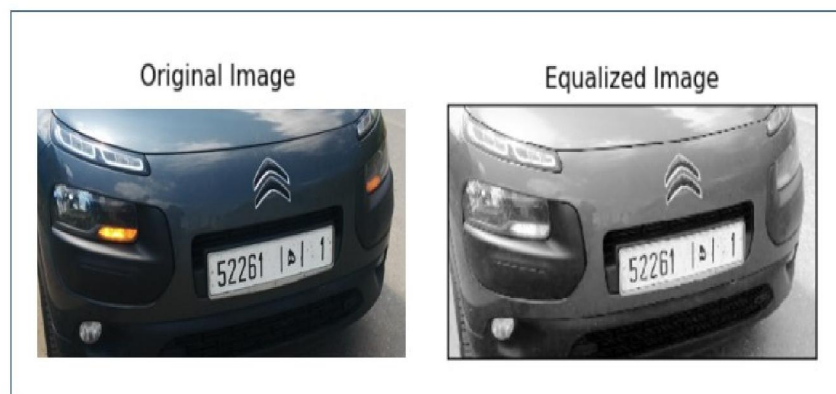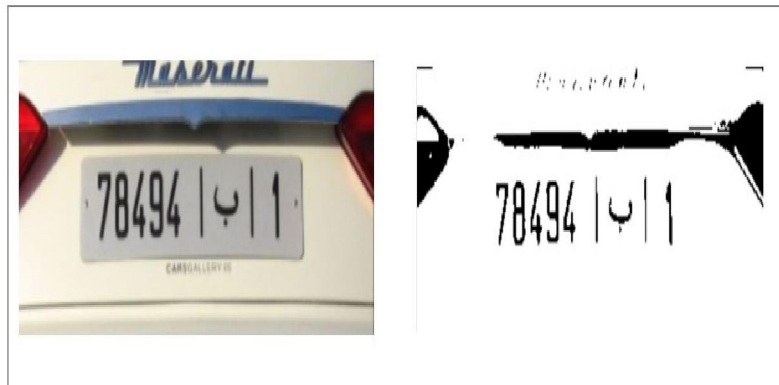
III. METHODOLOGY

The working of full NPR system can be divided in to two broad sections. The hardware part and the software part. The working mechanism of all the parts is described in details below.

extracted number plate, Character recognition, Comparison with database and Indicate result. The flow chart of license plate recognition system implementation in this work is shown in the following figure. There are various steps in this approach and these are

DOI: 10.48175/IJARSCT-10586

ISSN 2581-9429 IJARSCT

213
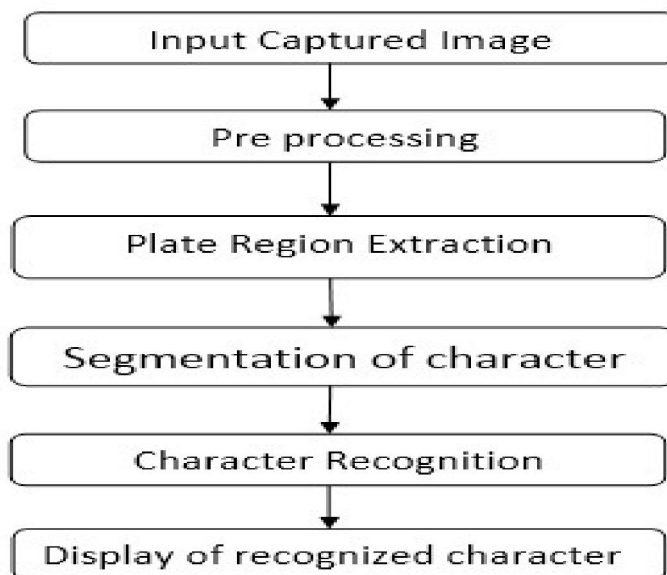
IV. WORK FLOW PROCESS

- **Capture of Image**: The first step is the capture of image. The image is captured by electronic device. Digital Camera or Webcam. The image captured is stored in JPEG format. Later on it is converted in to gray scale image in MATLAB.

- **Pre-processing**: The next step after capturing the image is the pre processing of the image. When the image is captured there is lot of disturbances and noises present in the image for which the image can't be used properly. So in this step the noises from the image are required to be cleared to obtain an accurate result.

- **Gray Processing:** this step involves the conversion of image in to Gray levels. Color images are converted in to Gray image. 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.

- **Median Filtering:** media filtering is the step to remove the noises from the image. Gray level cannot remove the noises. So to make image free from noise media filtering is used.

- **Plate region extraction: T**he most important stage is the extraction of number plate from eroded image significantly. The extraction can be done by using image segmentation method. There are numerous image segmentation methods available in various literatures. In most of the methods image binarization is used.

- **Character segmentation:** In this step get the o/p of extracted number plate using labeling components, and then separate each character and split the each and every character in the number plate image by using split and also find the length of the number plate, then find the correlation and database if both the value is same means it will generate the value 0-9 and A - Z, and finally convert the value to string and display it in edit box, and also store the character in some text file in this code. Following figure shows the segmented characters
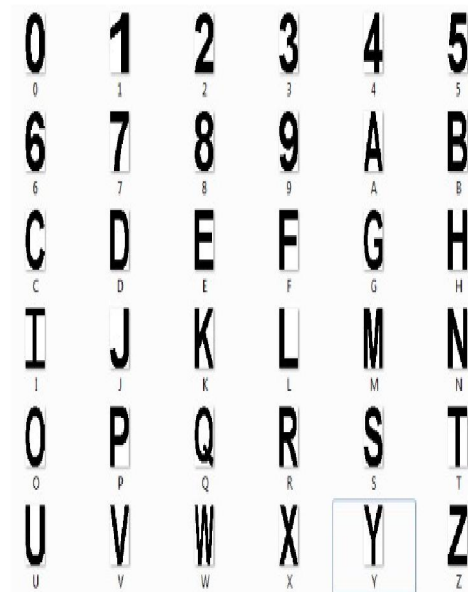
V. IMPLEMENTATIONS

The character recognition is now used to compare the each individual character with the character stored in the database. OCR uses the correlation method to match the characters. And if both the character matches then it displays the authorized otherwise it will display the unauthorized.

(A) Hardware Model: The hardware model consists microcontroller for controlling the complete hardware of the ANPR system. The ANPR algorithm on a PC receives the image and performs the processing, which Yields the vehicle number. This Number is then compared to standard database and finally provides signal to microcontroller to control the system Hardware. If the inputted plate contains the authorized number then the green indication light will be

switched on w, and if the inputted plate contains an unauthorized number then red indication will be switchedon. The complete hardware model is shown in figure below.
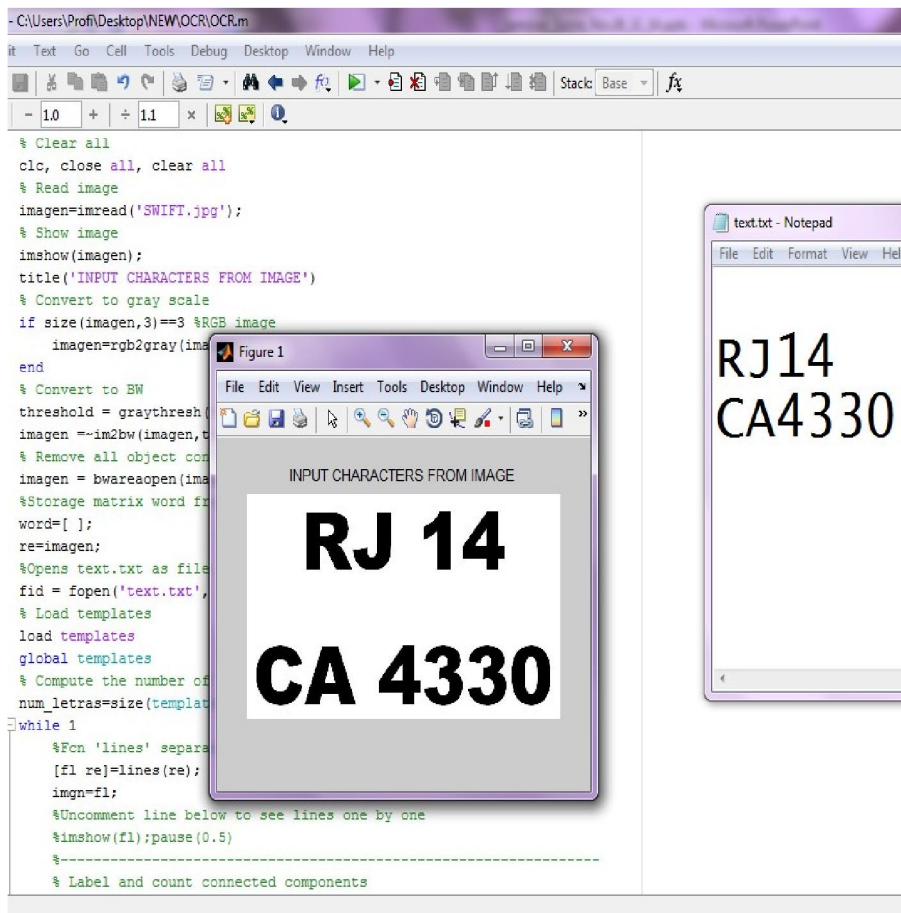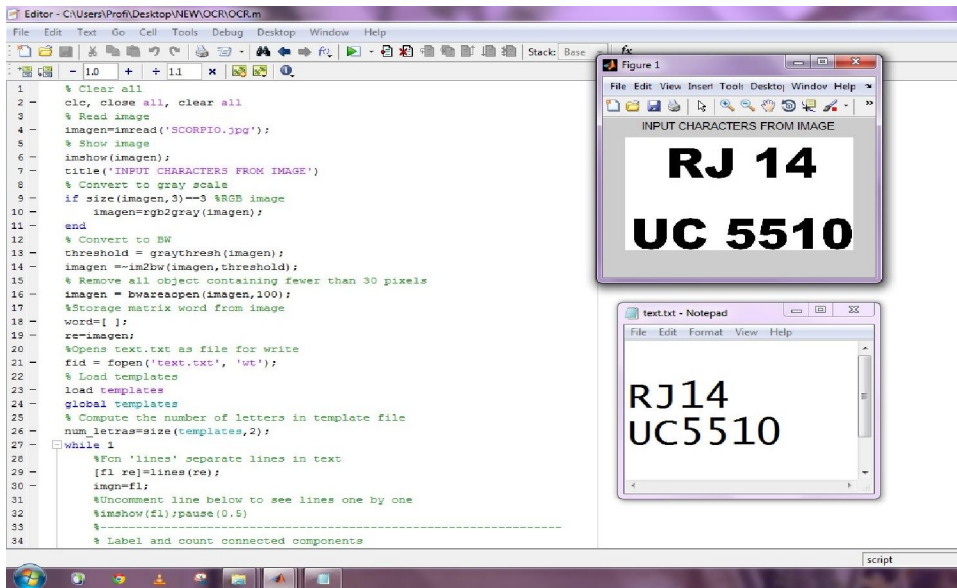
VI. EXPERIMENTAL RESULTS

This section presents the simulation results of the developed ANPR system. Different images of cars having different colours and structure types are taken and stored in PC. The screenshot of the simulation and are displays below. Two original images of vehicle are shown.

ANPR USING MATLAB

Matlab Based Vehicle Number Plate Recognition

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-10586

216

ISSN
2581-9429
IJARSCT

Author & Year	Outcome
K.K. Kim in 2015	Built a license plate recognition system by following a learning protocol. The camera captures an image inside the car detection module. Then, the picture of the candidate region is provided as output. The two TDNNs were taken as the horizontal and vertical filters to find the license plate. The segmentation rate was 97.5 per cent, and a recognition rate of 97.2 per cent for the proposed system .
Chin-Chuan in 2014	suggested a device that not only tracks several targets but also obtains high-quality images on plate numbers. A computer with a tuned dual-camera system has been built here by the author; a stationary camera and a pan-tilt-zoom camera are designed to monitor moving conveyance in an open field. The license plate for recognition has been sequentially identified by CNN classifier. As 64 vehicles entered this region illegally, data was composed manually from the science pictures and 59 IDs were accurately detected using this too
Madhusree Mondal in 2017	Developed an ANPR framework focused on the learning capabilities of convolutional neural networks. The self-synthesized function of CNN was used here, as it distinguishes the vehicle states from the number plate. The system was organized in this work in an echelon network of feature detectors that conducted consecutive processing of visual data pertaining to the dominant visual processing experience of the visual cortex, which influenced the computational model of the CNN. The findings of this research were observed with fewer training samples and turned out to be as 90 per cent higher precision rate
Rayson Laroca in 2018	proposed an ALPR system which discussed the robustness and effectiveness of a framework based on the state-ofthe- art YOLO artifact detector. The CNN are qualified and adapted for each ALPR stage to be resilient under different conditions. In this work, the author developed a two-stage attempt explicitly fo

VII. CONCLUSION

In this paper, we described a License plate recognition process. Indeed, lot of work has been done for evaluating some methods in Thresholding image, but our paper compared different types of thresholdmethods and showed the effect of using a combined method on standard im-age, rather than a single method to gain the complementarity of best selectedbinarization methods.We proposed an methodology to aid text region extraction from the vehicleimages, which starting with Pre-processing Image, and binarization using Medianof intensities from many tested algorithms like Adaptive Thresholding, Otsu's Thresholding, Edge detection, Morphological Gradient applied to Canny edgeDetector, Niblack Method, and then computing a new binary image combiningthe median and other methods.Experimental results show that the proposed method performs better in termsof ability to extract clear characters with the least amount of noise compared to the other binarization schemes, and with the lowest rate of error. This methodhas been tested on a large number of vehicle images captured by a camera undervarying illumination conditions.Moreover, the major contribution of this article is to help people and re-searchers interested in the practical detection of vehicle registration numbers. Future scope may include other segmentation or Morphological techniquesusing Real-Time Systems. Also using a larger dataset of images may lead to abetter convergence in further studies.

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-10586

217

ISSN
2581-9429
IJARSCT

REFERENCES

[1]. International Journal of Engineering and Technology Vol.2 (3), 200-206, 2010.

[2]. Saeed Rastegar, Reza Ghaderi, Gholamreza Ardeshipr & Nima Asadi, " An intelligent control system using an efficient License Plate Location and Recognition Approach", International Journal of Image Processing (IJIP) Volume(3), Issue(5) 252, 2009.

[3]. Wisam Al Faqheri and Syamsiah Mashohor, "A Real-Time Malaysian Automatic License Plate Recognition (M-ALPR) using Hybrid Fuzzy" ,IJCSNS International Journal of Computer Science and Network Security, VOL.9 No.2, February 2009.

[4]. Satadal Saha1, Subhadip Basu, Mita Nasipuri, Dipak Kumar Basu," License Plate Localization from Vehicle Images:An Edge Based Multistage Approach", International Journal of Recent Trends in Engineering, Vol 1, No. 1, May 2009.

[5]. Loumos, V.; Kayafas, E.,"License plate recognition from still images and video sequences: A survey" IEEE Transactions on Intelligent Transportation Systems, volume 9, issue 3, pages 377-391, September 2008.

[6]. Ganapathy and W.L.D. Lui, "A Malaysian Vehicle License Plate Localization and Recognition System", Journal of Systemic, Cybernetics and Informatics, Vol. 6, No. 1, 2008.

[7]. Roushdy M., "Comparative Study of Edge detection Algorithms Applying on the Grayscale Noisy Image Using Morphological filter", ICGST, International Journal of Graphics, Vision, and Image Processing GVIP, Vol. 6, Issue 4, pp. 17-23, , Dec. 2006.

[8]. Chirag N. Paunwala, Suprava Patnaik, "A Novel Multiple License Plate Extraction Technique for Complex Background in Indian Traffic Conditions", In Proceedings of International Journal of Image Processing, vol.4, issue2, 2007

[9]. D. Zheng, Y. Zhao, and J. Wang, "An efficient method of License Plate location," Pattern Recognit. Lett. vol. 26, no. 15, pp. 2431–2438, 2005.

[10]. Feng Yang and Zheng Ma. "Vehicle License Plate Location Based on Histogramming and Mathematical Morphology", Automatic Identification Advanced Technologies, pp: 89 – 94, 2005.

Copyright to IJARSCT
www.ijarsct.co.in

DOI: 10.48175/IJARSCT-10586

ISSN
2581-9429
IJARSCT

218