

A Review on Number Plate Recognition Using Image Processing

Sunil Sharma^{1*}, Rohidas Patil², Sahil Vaid³, Ramanuj Gupta⁴

¹⁻³UG Scholar, E & C, GTU / Sigma Institute of Engineering, Vadodara, Gujarat, India

⁴Asst. prof. E & C, GTU / Sigma Institute of Engineering, Vadodara, Gujarat, India

ABSTRACT

Automatic license plate recognition system is a real time embedded system which automatically recognizes the license plate of vehicles. The ANPR system is based on image processing technology. The proposed algorithm consists of two major phase (1) plate region extraction and plate recognition.

Keywords : Plate Region Extraction Optical Character Recognition Edge Detection Segmentation Pattern Recognition

I. INTRODUCTION

Nowadays vehicles play a very big role in transportation. Due to the rapidly increase in number of vehicles across the world's big cities and one of them is Cairo number plate recognition system has become one of the most important digital image processing systems to be used. Real time ANPR plays a major role in automatic monitoring of traffic rules and maintaining law enforcement on public roads. '

ANPR is used to identify vehicles by only their number plates. Since every vehicle carries a unique number plate, no external cards, tags or transmitters need to be recognizable, only number plate. ANPR is an image processing technology which enables to extract vehicle license plate number form digital images. It consists of a camera that has the capability to capture an image, finds the location of the number plate in the image and then extracts the characters using character recognition tool that translate the pixels into alphanumerically readable character or string.'

'ANPR can be used in many areas from speed enforcement and tool collection to management of parking lots, etc. At present, in ANPR there are several techniques used for the recognition plate's number such as pattern matching, neural network character recognition and image processing technology. Which are computationally expensive or use artificial neural network which involves complex mathematics.'



Figure 1: Number plate

The ANPR system works in these steps, the first step is the detection of the vehicle and capturing a vehicle image of front or back view of the vehicle, the second steps is the localization of number plate and then extraction of vehicle number plate in an image. The final step use image segmentation technique, for the segmentation several methods have been proposed neural network, mathematical morphology, colour analysis and histogram analysis.

II. RELATED WORKS

In [1] P.Sai.Krishna: In this text we found on the vehicle plates is detected from the input image and this requires the localization of number plate area in order to identify the characters present on it. In literature we can find many methods for number plate detection and recognition system. The major drawback is how long will it will take compute and recognize the particular licence plates.

In [2] Amita Mundie: Today at Present there are techniques available for plate using RCN(Readymade Chassis number) In this system if the person want to know any details about who own the particular vehicle then only on the website of national government www.vahan.nic.in we can find out these details.

In [3] Vishal Srivastava: This process also helps to get the correct result compared to manually one. The process of working involve that as soon as the vehicles enters the secured area the system automatically captures the images and stores it.the processing of the image is done through the software stored in the system.

In [4] Vaishali Gupta: The scientific is deploying research in intelligent transportation system which have a significant impact on people lives. Automatic license plate recognition is a computer vision technology to extract the license number of vehicles from images.

In [5] Bijender Mehandia: Number plate are used for identification of vehicles all over the nations. Vehicles are identifying either manually or automatically. Automatic vehicles identification is an image processing technique of identify vehicles by their number plates.

III. METHODOLOGY

This project aims to focus on the image processing algorithm in ANPR system which is simulated in mat lab software. Images that are taken should be clear enough to be processed and should not contain any defects in the number plate for example missing characters'

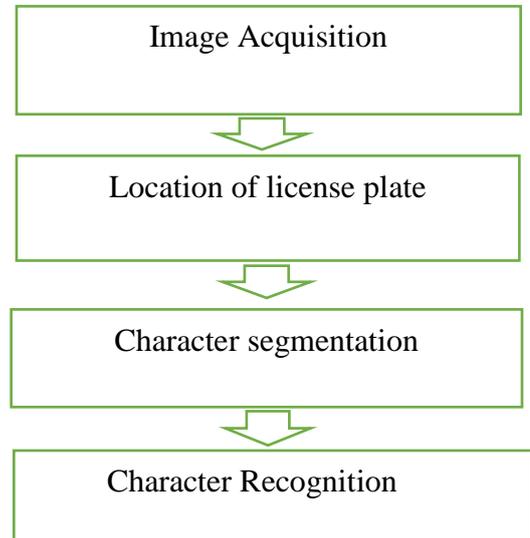


Figure 2: Basic Steps of ANPR System

'Image Acquisition: - Initial Phase for Number Plate Recognition is Image acquire can be from any method like image analog or digital, where the image can be obtained from any video. Image acquisition is very important step in the number plate recognition, as it is affected by illumination, weather, angle of rotation, resolution of image required etc. [11] Where the Image obtained from any Source can be in any image format like jpeg., Gif, ,tiff but more Jpeg is preferable because further operation can be performed efficiently and easily.2

Where the image is acquire for further image processing tasks. The image obtained is in digital form it's good otherwise the image is converted to the digital format by any means.

Pre-processing & ROI Extraction: - Image obtain from any storage can be of any colour, any format or different properties. Here the main first step is pre-processing in which the original or RGB image is

converted to Gray Scale [8] [9] [11]. There exist some techniques which were used by many researchers like NTSC Standard method [5] [11], Otsu method etc. which are further explained in literature review. After that filtering process is applied in pre-processing task there exist various filtering techniques but more preferably median filtering [5] [6] [9] is used by many researcher for noise removal process.

'ROI (Region of Interest) Extraction:-where the image obtained after the pre-processing contains the whole background area also including the body of Vehicle and many more area it can which is unused. So the region of interest is need to be extracted for further process. There are the various existing techniques which were proposed by many researcher for ROI Extraction like binarization using variable thresholding technique [1], Sauvola method [2] where the binarization for the highlighting character & Suppressing background, Edge detection technique [3], Semering Algorithm [3], Morphological Operations [4], Improved Bernsen algorithm [7], Window filtering method [8] etc. More techniques are explained in the literature review.'

Number Plate Segmentation: Where the image obtained after the Region of Interest extracted is further need to be segmented. In this process image is further segmented for the character or number recognition purpose. There exist various techniques which provide the task of number plate segmentations like Semering Algorithm [3], Histogram Process [4] [6], Otsu Method [5], Horizontal and Vertical Approach [7] [10], region props function using MATLAB etc. and more techniques are explained in the literature review.

Character Recognition: Where the number plate segmented after that recognition of number or character is need for further process. There exist various techniques for character segmentation which are like Licensed Under Creative Commons Attribution CC BY segmentation based on Neural network [2] [4] [10] [10], Probabilistic Neural Network (PNN) [2], Multi-layer perception model of

ANN (Artificial Neural Network) [6], Support Vector Machine (SVM) [7], Statical/Hybrid classifier Approach [4] etc. and more techniques are explained further in literature review. After the character recognition the process of character matching with database take place which is implemented by many researcher by OCR (Optical Character Recognition) which can use the concept of Statical based template matching and further more are discussed in literature review'

The variations in Number plate types and environments create challenges in Number plate recognition. These can be like that Number Plate Variations can be one of the given below:

[A] Location of Plate: - Number Plate Exist or Not. Having more than one number plate, Different location of Number plate.

[B] Size of Plate:-There can the size of plate can be varying due to capturing of image.

[C] Plate Colour: - Different Plate having different Colour variations in background or also based on capturing device.

[D] Character & Number Font: Number Plates of different Countries may Contains the data in different format than others.

[E] Occlusion Plate: Plates may be covered by dust or it can be blurred type.

[F] Other: where the Number Plate Can Be tilled, a plate having frames and screws etc. Environmental variations:

[G] Different Illumination: Our taken images may have different types of illumination, Can be due to weather condition, due to environmental condition or due to vehicle own or other lightning etc.

[H] Image Background: The image background can contain complex figure, the area of plate same as background etc.

IV. CONCLUSION

In this review paper, the automatic number plate recognition system using vehicle license plate is presented. The system use image processing techniques for identifying the vehicle from the database stored in the computer. The system works satisfactorily for wide variation of conditions and different types of number plates. The system is implemented and executed in MATLAB and performance is tested on genuine images.

V. REFERENCES

- [1] Ganesh R. Jadhav, Kailash J. Karande, "Automatic Vehicle Number Plate Recognition for Vehicle Parking Management System", Computer Engineering and intelligent system. IEEE, ISSN 2222-1719 (Paper) ISSN 2222-2863 Vol.5, No.11, 2014.
- [2] P. Sai Krishna, "Automatic Number Plate Recognition by using Matlab", Electronics and Communication Engineering. IEEE, ISSN 2349-4042(Paper) ISSN 2349-4050 Volume 2. No. June 2015.
- [3] Amita Mundhe, "Automatic Number Plate Recognition Using Smart Phones" Computer Engineering. IEEE, ISSN: 2278-0181 Volume.2, April 2013.
- [4] Prof. Mr. A. V. Shah, "Number Plate Recognition Using an Improved Segmentation", IJIRSET, ISSN: 2319-8753 Volume 3, May 2014
- [5] Dhiraj Y. Gaikwad, Pramod B. Borole, "A Review Paper on Automatic Number Plate Recognition (ANPR) System", Electrical Department. IJIRAE, ISSN: 2278-2311 Volume 1. April 2014.
- [6] Belal R. Mohamed, "Automatic Number Plate Recognition", Electrical Department, IJSRP, ISSN 2250-3153 Volume 3, December 2013.
- [7] Ashish Khatri, "Automatic Number Plate Recognition System for Indian Conditions", Electronics and Telecommunication. IEEE, July 2009.
- [8] Archana Bindu Sunil, "Secure matching of Dutch car license plates", IEEE, ISSN: 2076-1465, December 2016.
- [9] Sarbjit Kaur, "An Efficient Approach for Automatic Number Plate Recognition System under Image Processing", IJARCS, ISSN: 0976-5697 Volume 5, August 2014.
- [10] Anisha Goyal, Rekha Bhatia, "Automatic Car number plate detection system to detect far number plate", IOSR, ISSN: 2278-8727 Volume 18, Aug. 2016.
- [11] Kushal Pardeshi, "Automatic number plate recognition system: machine learning approach," IOSR, ISSN: 2278-0661, May 2012.
- [12] Anirudha Puranic " vehicles number plate recognition system: a literature review and implement using template matching", IJCA, ISSN: 0975-8887 Volume 134, January 2016