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Automatic Number Plate Recognition (ANPR) and Road Safety in India

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ABSTRACT

This paper discusses the role of ANPR (Automatic Number Plate Recognition) in monitoring over-speeding vehicles, the generation of challans and parking tickets, law enforcement, and reducing road casualties in India. This software is being used worldwide. But its application hasn't been quite explored in India. Here, we talk about how ANPR can be utilized to raise road safety standards in India. The system's implementation difficulties have also been highlighted. There are many image processing tools available for Number plate detection; this paper discusses the use of MATLAB Image Processing for converting a number plate picture into its corresponding text file.

Keywords: ANPR (Automatic Number Plate Recognition), Image Processing, Number plates, Over-speeding, Parking.

INTRODUCTION

Automatic Number Plate Recognition (ANPR) is a widely used technology these days. The ANPR system is used at many places like Highways, Toll Booths, Hotels, Hospitals, Parking Lots, Defense Military Checkpoints, Petrol Pumps, Shopping Malls, and Airports, etc for monitoring, record-keeping, automatic challan, parking ticket generation, etc. The camera of the ANPR system captures an image of the vehicle number plate, which then undergoes multiple numbers of algorithms; giving the number plate reading in text format as a result. Typically it takes 20 to 50 milliseconds for the image analysis.

Need of ANPR in India

According to National Crimes Records Bureau (NCRB) 2021 data, there were 4,22,659 traffic accidents in 2021 compared to 3,68,828 in 2020 in the country. Additionally, from 0.45 per thousand vehicles in 2020 to 0.53 in 2021, the number of fatalities from traffic accidents increased. According to a cause-and-effect analysis of traffic accidents, over-speeding was the primary factor in 59.7% of incidents (2,40,828 out of 4,03,116) and claimed 87,050 fatalities and 2,28,274 injuries. ANPR is used to monitor the speed of vehicles and can identify the ones that exceed the speed limit. For this, cameras are installed at various locations. Using ANPR, the time taken by a certain vehicle to cover the distance between any two locations can be recorded and its speed can then be estimated. The due ticket can be charged to the registered license plate. This not only helps to maintain law and order but also reduces the number of road casualties.

In addition to this, ANPR can aid parking management too. If the number plates are linked with the owner's mobile phone then the parking tickets could be paid directly from the user's account against the generated ticket number. Pre-booking and advance payment can also be done with the help of a proper cloud-based system. According to a survey by Livemint Paper, while the number of vehicles in New Delhi increased by only about 56% between 2012 and 2021, car thefts increased by 103% during the same time. In order to lessen this number, the ANPR system can be used to track the route taken or traveled by the thieves. This can help in fulfilling the promised justice to the victims, and that too well in time.

Challenges of ANPR in India

The variance in accuracy levels of ANPR in various countries primarily is due to the presence or absence of fairly standardized license plates. In particular, the presence of so many different types of number plates makes it difficult to

design a fitting set of algorithms for decoding. The plates not only vary in fonts, sizes, colors, and styles but their positions on the vehicle also vary. Moreover, ANPR requires expensive cameras because the low-cost ones have limited visual coverage and compromise with acute motion and detection sensors, and also contain limited night vision capabilities. Because of these factors, the occurrence of blind spots and of blurry images increases; especially during nighttime and inclement weather conditions.

Detection of Car Number Plate using MATLAB Image Processing

The camera of the ANPR system captures an image of the passing vehicles' number plate, which then undergoes multiple numbers of algorithms; giving the number plate reading in text format as a result. There are many image processing tools available for this Number plate detection; this paper discusses the use of MATLAB Image Processing for converting a number plate picture into its corresponding text format. The MATLAB Code provided here consists of three programs (.m files). The first file is used to call the saved binary images of alphanumeric and then save them as a new template (as a .mat file). The second file examines the input image and finds the highest-matched alphanumeric. The third and final code file processes the input image and calls the first two files for detection purposes.

MATLAB Code for the third file is as follows –

```
close all;
clear all;
im = imread('Import Number Plate Images/image1a.png');
imgray = rgb2gray(im);
imbin = imbinarize(imgray);
im = edge(imgray, 'prewitt');
Iprops=regionprops(im,'BoundingBox','Area', 'Image');
area = Iprops.Area;
count = numel(Iprops);
maxa= area;
bounding Box = Iprops. Bounding Box;
for i=1:count
if maxa¡Iprops(i).Area
maxa=Iprops(i).Area;
boundingBox=Iprops(i).BoundingBox;
end
end
im = imcrop(imbin, boundingBox);
im = bwareaopen( im, 500);
h, w = size(im);
imshow(im);
Iprops=regionprops(im,'BoundingBox','Area', 'Image');
count = numel(Iprops); numPlate=[ ];
for i=1:count
ow = length(Iprops(i).Image(1,:));
oh = length(Iprops(i).Image(:,1));
if ow<(h/2) & oh>(h/3)
letter=Letterdetection(Iprops(i).Image);
numPlate = [numPlateletter]
end
end
```

After we run and execute the last file, the number plate image will popup and then the number will get displayed in the command window.

For example, if the following image is used as input –

the output will be as follows
- 4 noPlate = MH03DA9647

CONCLUSION

Though ANPR is a very useful tool still its usefulness and success depend on the availability of a proper budget for quality cameras and the use of standardized number plates. The use of hand-painted plates needs to be completely eliminated. Definite guidelines for license plates should be set by the officials so that we can reach the dependable accuracy level of ANPR algorithms. With a proper amount of research and data collection, the algorithms could be improved and this will compensate for the photo quality, lighting, and weather conditions. Quality motion detection, focus camera, and lighting will aid in excellent results.

REFERENCES

[1]. "Automatic Number-plate Recognition - Wikipedia." *Automatic Number-plate Recognition - Wikipedia*, 1 Dec. 2012, https://en.wikipedia.org/wiki/Automatic_number-late_recognition#:~:text=Automatic%20number%2Dplate%20recognition%20(ANPR,to%20create%20vehicle%20location%20data .

[2]. "ADSI-2021 | National Crime Records Bureau." *ADSI-2021 | National Crime Records Bureau*, https://ncrb.gov.in/en/ADSI-2021 .

[3]. Livemint. "Delhi-NCR Accounts for More Than 56% of Vehicle Thefts in India: Report." *Mint*, 17 Oct. 2022, www.livemint.com/news/india/delhincr-accounts-for-more-than-56-of-vehicle-thefts-in-india-report-11666006821516.html .

[4]. "Car Number Plate Detection Using MATLAB and Image Processing." *Car Number Plate Detection Using MATLAB and Image Processing*, https://circuitdigest.com/tutorial/vehicle-number-plate-detection-using-matlab-and-image-processing .

[5]. "ANPR for India | Plate Recognizer ALPR." *Plate Recognizer*, 22 July 2020, https://platerecognizer.com/anpr-for-india/ .

[6]. saiabhishek28. "GitHub - Saiabhishek28/Image-Recogonition-MATLAB-for-Number-Plates: Car Number Plate Detection Using MATLAB and Image Processing." *GitHub*, 20 May 2019, https://github.com/saiabhishek28/Image-Recogonition-MATLAB-for-Number-Plates .