AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM

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INTRODUCTION

- Automatic Number Plate Recognition (ANPR) system is a technology that uses optical character recognition on images to read vehicle registration plates.
- It is widely used for traffic monitoring, law enforcement, and toll collection.
- The system can capture and store the images, as well as the location, date, and time of the vehicle. ANPR provides valuable data for traffic management and security purposes.
- ANPR is an IOT solution that uses computer vision technology to automatically scan vehicle number plates without human intervention.

REPORTED LITERATURE

SI.No	ARTICLE NAME	AUTHOR	YEAR	DESCRIPTION
1.	Automatic number plate recognition using TensorFlow	Dr. Vishwanath Burkpalli , Abhishek Joshi	2022	Our proposed system utilizes cutting-edge technology to detect vehicle number plates, segment characters, and recognize them from images. Enhanced technology that automatically detect vehicle license plates present challenges.
2.	Automatic Vehicle Number Plate Recognition System Using Machine Learning	J M S V Ravi Kumar, B Sujatha	2020	The Number Plate Recognition (NPR) system, a facet of Smart Transportation and Detection Mechanism (STDM), automates license plate reading from digital images. Despite efforts to ensure quick detection, the system's processing time might still be a concern, especially when dealing with large volumes of images or real-time applications.
3.	Automatic number plate recognition	Vanshika Rai and Deepali Kamthania	2019	For license plate detection, it employs techniques based on vertical edge detection and high-density area analysis. Character recognition is performed using a K-nearest neighbors (KNN) classifier. Challenges like environmental variability, speed limitations, and non-standard plates pose areas for improvement, demanding robustness enhancements.

REPORTED LITERATURE

SI.No	ARTICLE NAME	AUTHOR	YEAR	DESCRIPTION
4.	Automatic Number Plate Recognition: A Detailed Survey of Relevant Algorithms	Lubna , Naveed Mufti, and Syed Afaq Ali Shah	2021	The paper surveys ANPR algorithms, categorized by recognition stages, discussing performance and challenges. Lack of a common dataset hampers uniform evaluation. ANPR systems rely on complex capabilities, lacking standardization across regions. OCR engines are tailored to specific countries, and vendor solutions vary in strengths, tailored to regional needs.
5.	Automatic Number Plate Recognition	Gaurav Srivastava, Aashish Sharma, Abhishek Mittal	2020	In this system, number plates are analyzed using application software to identify the owners of vehicles. Identifying broken or fuzzy plates, changes in observable regions, hazy images, and trouble telling apart similar symbols like O and D, 5 and S, 8 and B, or E, O, and 0 are among the difficulties.

OBJECTIVE OF PROJECT

- ✓ The main objective of a number plate recognition system is to automatically detect, recognize, and interpret license plates on vehicles.
- ✓ It identify the vehicles involved in criminal activities, track stolen vehicles, and enforce traffic laws by automatically detecting license plates.
- ✓ The system aims to achieve high accuracy in reading and recognizing license plates, reducing errors in data collection.
- ✓ ANPR is to enhance the efficiency of vehicle tracking and monitoring.

ADVANTAGES OF PROPOSED WORK

- By automatically recognizing and logging license plate numbers, these systems help in enhancing security by identifying vehicles entering or leaving certain areas, such as restricted zones, parking lots, or border crossings.
- This helps in Crime Prevention and Detection by identifying vehicles involved in criminal activities, such as theft, hit-and-runs, or Amber Alerts, by quickly scanning and matching license plate numbers against databases of stolen or wanted vehicles.
- Number plate recognition systems aid in managing traffic flow by monitoring vehicles' movements, identifying traffic violations, and facilitating automated toll collection and congestion pricing systems.
- They reduce the need for manual intervention in tasks such as vehicle registration, toll collection, and parking management, leading to cost savings and operational efficiencies.

USED ALGORITHM

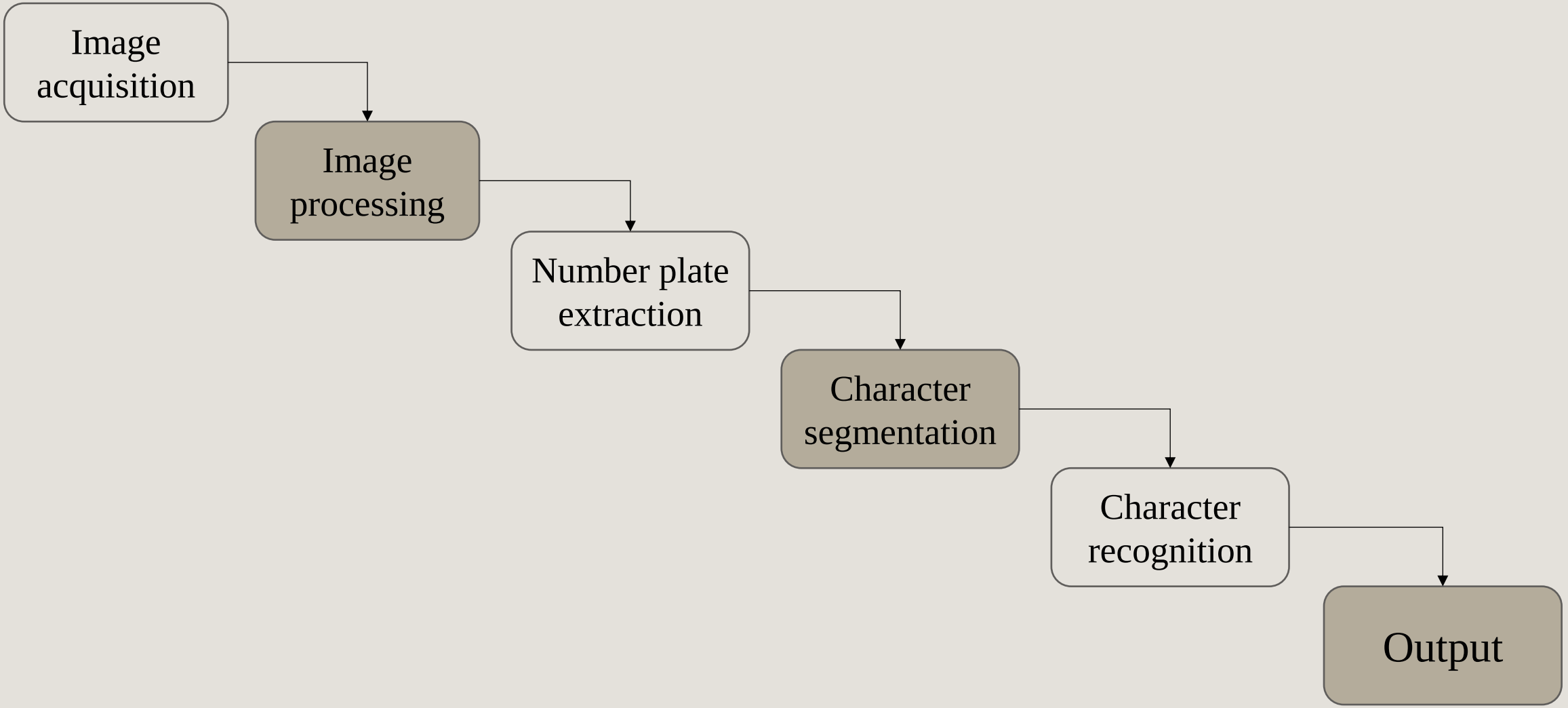
Optical Character Recognition(OCR) Algorithm:

- It is an important computer vision technique for reading text from images. This allows the ANPR system to identify license plates.
- Image processing techniques such as Tesseract OCR or MaskOCR algorithms are used to detect individual characters, verify the sequence of those characters, and convert the number plate image to text.

Template Matching:

- Template matching is a technique to compare an image of a license plate against a library of images of license plates to find a match. Template matching is a technique for finding a specific pattern in a text string. In the case of ANPR, the set of characters are the vehicle number plates.
- Template matching in ANPR involves creating character templates, preprocessing images, sliding templates over regions of interest, and calculating similarity scores.

WORK DONE IN STEP BY STEP DESCRIPTION



WORKING

Image acquisition-

- The initial step is the Acquisition of an image i.e., getting an image using the digital camera associated with the PC.
- These Caught images are in RGB format so it can be further process for the Number Plate Extraction. The database system contains the personal information of the vehicle proprietor and a few plate vehicle images, abbreviations.

WORKING

Image processing-

- Right now, color picture is changed over into a grayscale picture by applying image desaturation.
- OpenCV almost has the perfect capacity to change over color pictures to grayscale and the impact of this capacity is exhibited in figure.

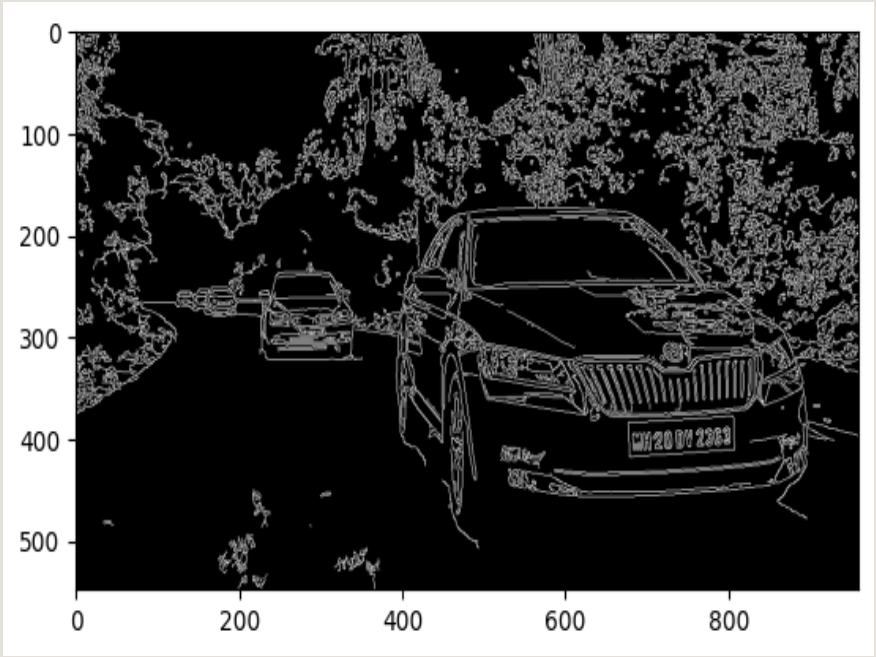
WORKING

Number plate extraction-

- Extraction of number plate from the image is initially the most important and critical stage for ANPR systems.

Edge Detection-By Sobel Operator

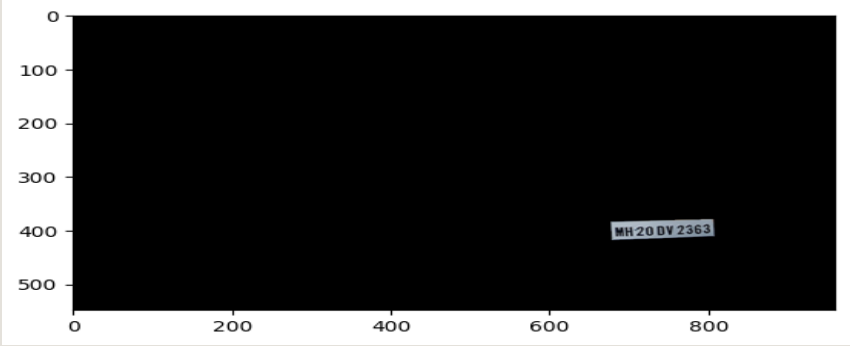
- The Sobel operator is one of the most commonly used edge detectors.
- The first is dedicated to the evaluation of vertical edges, and the second to the evaluation of horizontal edges



WORKING

Character segmentation-

- Character segmentation in number plate recognition involves detecting individual characters within the plate region, then separating them accurately for subsequent recognition.
- It is one of the decision processes in a system for optical character recognition (OCR).

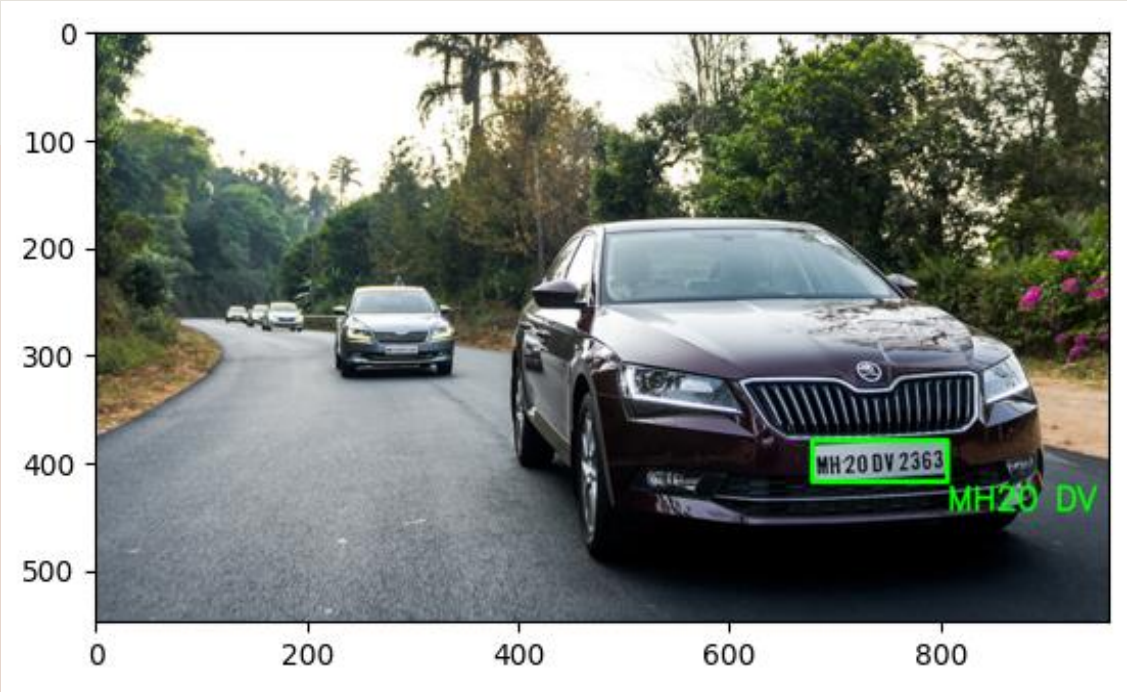


WORKING

Character recognition-

- Character recognition is the optical character recognition (OCR) is used to look at the every individual character against the complete alphanumeric database.
- The OCR really uses relationship strategy to match individual character and finally the number is recognized and stored in string format in a variable

RESULTS AND DISCUSSION



LICENSE PLATE NUMBER

MH20 DV 2363

RESULTS AND DISCUSSION

- The images above illustrates the results of the license plate.
- It will detect the vehicle’s license plate from given input image as well as from the real time feed, as shown in images.
- It uses Optical Character Recognition (OCR) gives us the ability to extract text from the regions of interest. In this particular case we will use EasyOCR.
- If the extracted number plate image has more characters or words rather than number and variables then we use OCR filtering to crop only the car number or variable and erase other unwanted words/characters.
- The final step to verify whether the sequence of the image characters/variables are correct and convert the number plate image to text.

SUMMARY

- The Automatic Number Plate Recognition (ANPR) system encompasses advanced identification technology for accurately recognizing vehicle license plates.
- It involves efficient processing, data extraction, and analysis of the captured information. ANPR finds applications in law enforcement, toll collection, and traffic management.
- ANPR systems also raise concerns regarding privacy and data security.
- ANPR systems identify license plates within captured images, employing Optical Character Recognition (OCR) techniques to extract alphanumeric characters.

REFERENCES

- ✓ Sheida Hadavi et.al “Analyzing passenger and freight vehicle movements from automaticNumber plate recognition camera data” 2020
- ✓ Jepthah Yankey et.al “Aan Automatic Number Plate Recognition System using OpenCV andTesseract OCR Engine” 2018
- ✓ Shiqiu Liu, Yiyu He,Zhenyu Xu, YifanZhu, and Han Huang, "The Chinese-style Plate Recognition Based on the Artificial Neural Network and Statistics,” The Procedia Engineering, vol. 15, pp. 3556-3561, 2017.
- ✓ Li, Jie; Zuylen, Henk van; Deng, Yuansheng; Zhou, Yun (2020). Urban travel time data cleaning and analysis for Automatic Number Plate Recognition. Transportation Research Procedia,47(),712719. doi:10.1016/j.trpro.2020

THANK YOU