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Automating Parking System using Python

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Abstract: *In many developing countries the increase in population increases day by day rapidly. In cities people can face many problems including parking to park the vehicle. Normally at places such as theaters, market areas, malls and offices and in metropolitan cities. This project is designed to relax from the time-consuming parking system. In this project we used an advanced smart parking system. In parking, firstly when a car enters it shows availability or unavailability of parking in the display to ensure the space of parking. Every motor vehicle enterssociety, the automatic parking system registers data on the system of every person, and it can record the plate no. License enters addresses etc. We use ANPR automatic Number plate Recognition to capture the number of plates and their data on the ANPR system. Opens is a computer which a library uses for video capturing, image processing and machine learning and helps to provide the standard development environment for computer vision applications by including capabilities like face detection and object detection.*

Keywords: ANPR, ITS, Image Enhancement, Edge Detection, Morphology Operation, Number Plate Extraction, Open cv.

I. INTRODUCTION

In the fast developing and technology adapting world the traditional parking system of vehicles is lagging and is time consuming by writing the vehicle's no plate information, the owner's information, verifying his identity, noting it's entry and exit time etc. Also finding a space for parking in the parking lot is difficult causing high frustration and increase in stress level of the drivers. Doing this time, labor and resources consuming with the help of one of the python libraries i.e., open CV which is computer vision and machine learning library that allows us to perform image processing and computer vision tasks. It provides us with a wide range of features, including object detection, face recognition, and tracking thus helping in extracting text from images. Thus, the adaption of this technology in the parkingspaces of offices, housing society, schools and colleges etc. It can increase operation speed and can increase movability in a less time-consuming way.

II. LITERATURE SURVEY

1] A.Durga Praveen Kumari et al in "Automatic Smart Car Parking System Using lot and Python" This paper discusses the use of Iot and Python to create an automatic Smart Car Parking System using Iot and Python. It also discusses the discomfort of looking out for a vacant parking slot in public places such as multiplex theaters, market areas, hospitals, function-halls, offices, residential housing societies and shopping malls. Finally, it discusses the need for people to update with the growing technology. This paper presents an Advanced Smart Parking System (ASPS) which detects the car and displays the vacant slot on the display at the entrance of the parking lot.

The system used automatically assigns the nearest vacant bay to drivers and provides the best optimal path to reach the parking slot provided with the directions shown using LEDs. The implementation involves minimal human interaction and provides a seamless parking experience, reducing time wasted by the user. The current parking system in Malaysia requires drivers to receive parking tickets and find the parking lot by themselves, leading to time and fuel wasting and high frustration and stress levels. To reduce this, there is a need to develop an automated parking system that indicates directly the availability of vacant parking slots inany lane right at the entrance. The proposed intelligent parking system is a counter-based indoor car parking system which can count, display, assign and assign the nearest parking slot.

2] Vimal Raj et al in "Automatic Number Plate Recognition System (ANPR)"This The paper discusses the use of ANPR to capture the number plate image automatically using ANPR system. This paper describes the use of ANPR over traditional parking methods. It starts with describing the importance of number plates issued by the RTO. The use

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of number plates is easily readable by humans. Each one is adopting a different style leading to obtaining variation in parameters like, size of number plate and characters, location of number plate, type of font used, background (white background with black letters for noncommercial vehicles and white background with yellow letters for commercial vehicles), different unwanted pictures etc. With the help of ANPR. It becomes easy to get vehicle information by capturing its number plate. Typical applications of ANPR systems are traffic law enforcement, automatic toll collection or parking lot access control. ANPR is an image processing system which recognizes the vehicles' number plate. Some ANPR systems may use simple image processing techniques, performed under controlled conditions for predictable license plate styles, Hogver, dedicated object detectors-such as HOG, CNN, SVM and YOLO to name a few-more used by advanced ANPR systems.

3] Ganesh R. Jadhav et al in "Automatic Vehicle Number Plate Recognition for Vehicle Parking Management System" In ANPR, a camera capture this is vehicle image and a computer processes them recognizes the information on the number plate by applying various images Processing and optical character recognition techniques since there are problems such as poor image quality, image perspective distortion, other disturbance characters of reflection on vehicle surface, and the color similarity between the number plate and the background vehicle body, the number plate is often difficult to be located accurately and efficiently. Accurate detection of the plate region is an essential process to go over to the step of character recognition. There are two major methods to extract the number plate region.

(1) Edge Detection

(2) Finding rectangles in a vehicle Image

4] Ayush Srivastava et al in "Vehicle Number Plate Detection Using Python "We use python and open vision library programming. The ALPR framework presents an alternative strategy to work with open Cv. First, a photograph of the vehicle is taken using a photography camera. This camera is used at highway toll gates etc.

This system uses following libraries:

1. Open CV: Open-source computer vision library. This makes the process easier and faster and improves it.
2. Canny edge detection: It is applied to remove noise from the picture.
3. Proposed System: In this, with the help of CCTV, the photograph which is automatically saved in the database is taken back from the database. After that the number plate is searched and the output is taken.
4. Gray scale: It converts photos to black and white. This type of system is used in toll plazas, mall parking places, etc.

5] Ashwin Jaware et al in "Vehicle Number Plate Detection and Owner Identification "When a vehicle enters the parking area the system captures the number plate. In this project real time number plate detection is used. This can also be used in monitoring and automatic challan in the cities. In case of breaking law and in the automatic parking system, for the project we use open CV which is a great library for video capturing, image processing and machine learning and helps to provide the standard development for computer vision applications like Face detection and object detection. After performing these steps, we can easily detect the license number from the image / video of the car through the camera. After that, the information about the vehicle and vehicles over all data will be directly saved to the database. Hence through this, we can automate the car parking process and allow entry only to the authorized vehicles.

III. PROPOSED SYSTEM

In this project iot (internet of things) pays a vital role in the parking iot technology base parking system it can be use to easily open gate let vehicle enter in the parking system but when a car enters the parking firstly CCTV camera capture the image of number plate to recognize the car plate number to find the vehicle owners information in database. In the car parking system, some place is available for vehicle parking shown in the display to ensure the car owner realizes the space available in parking.

IV. METHODOLOGY

1. Open CV: OpenCV is a sizable open-source library for image processing, machine learning, and computer vision. It now plays a significant part in real-time operation, which is crucial in modern systems. With it, one may analyze pictures and movies to find faces, objects, and even human handwriting. Python can handle the OpenCV array structure for analysis when it is integrated with different libraries, such as NumPy. We use vector space and apply mathematical operations to these features to identify visual patterns and their various features.

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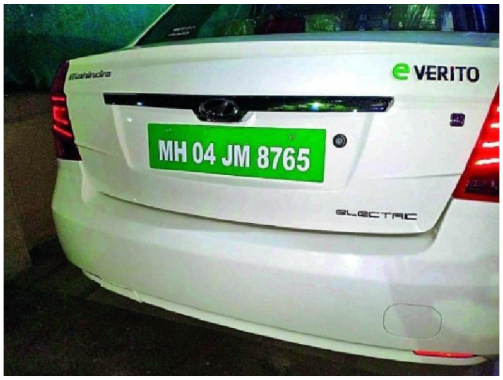
Implementation steps of number plate recognition



Number plate recognition (NPR) is a computer vision technology that can be used to automatically detect and recognize license plates in images or video streams. Here are the general steps that can be followed to implement a number plate recognition system:

Image acquisition: Capture the image or video feed containing the license plates using a camera or other imaging device.

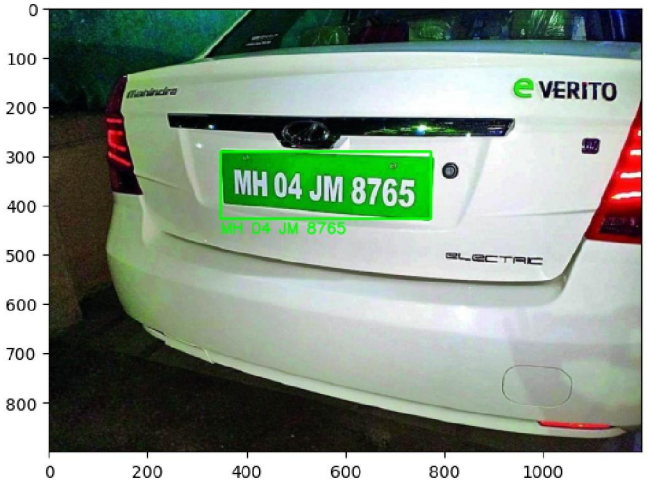
Image preprocessing: Preprocess the image to remove noise and enhance features. This can be done using various image processing techniques available in OpenCV, such as thresholding, Bilateral Filtering, Canny Edge Filter, matploitib, and morphological operations.

Plate detection: Use object detection algorithms such as Hear cascades or deep learning-based models to detect license plates in the images and plot the cropped image.

Character segmentation: Once the license plate is detected, segment the individual characters from the plate using techniques such as contour detection or connected component analysis.

Character recognition: Recognize the segmented characters using optical character recognition (OCR) techniques. This can be done using open-source OCR libraries such as Tesseract or by building custom models using deep learning frameworks such as TensorFlow or PyTorch.

Postprocessing: Apply post processing techniques such as error correction and filtering to improve the accuracy of the recognition results.



Output: The final output can be displayed on a screen or stored in a database for further analysis.

Overall, implementing an NPR system is complex and requires expertise in computer vision, image processing, and machine learning. However, there are many open-source libraries and pre-trained models available that can simplify the process and enable faster development.

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V. CONCLUSION

Python and OpenCV, two potent image processing and machine learning tools, can be used to create automated parking systems. These systems employ cameras to find and track moving vehicles, while algorithms help choose the best parking spaces.

A precise and dependable automatic automobile parking system that can handle many vehicles can be made using Python and OpenCV. The system can be tailored to fit needs and combined with other technologies like sensors and Internet of Things (IoT) gadgets.

In conclusion, the way we park our cars has been completely transformed by the usage of Python and OpenCV in automatic parking systems. These solutions improve parking experience and are effective and affordable

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