“CAPTURE”
AUTOMATIC LICENSE PLATE RECOGNITION WITH AUTOMATIC ENTRIES

Submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering Degree in Computer Science and Engineering

By

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INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade “A” by NAAC|12B Status by UGC | Approved by AICTE
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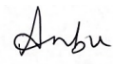
BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **Mukeshwaran.R (39110647) and Krishna Rohith.D (39110538)** who carried out the project entitled **Automatic License Plate Recognition With Automatic Entries (CAPTURE)** under my supervision from December 2022 to April 2023.



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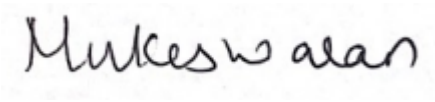
DECLARATION

I,**MUKESHWARAN.R (Reg No:39110647)** hereby declare that the Project entitled **"AUTOMATIC LICENSE PLATE RECOGNITION WITH AUTOMATIC ENTRIES"** done by me under the guidance of **Ms. G. ANBU SELVI M.Tech., (Ph.D.)** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in **Computer Science and Engineering.**

DATE:24.04.23



PLACE :Chennai **SIGNATURE OF THE CANDIDATE**

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I am pleased to acknowledge my sincere thanks to the Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

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ABSTRACT

ALPR is a computer vision technology that detects and records license plates on vehicles. It's used for law enforcement, parking management, and toll collection. Our proposed ALPR system goes beyond plate recognition and enables automatic entries based on license plate information. The system has three components: image acquisition, plate detection and recognition, and entry automation. Cameras capture license plate images at entry and exit points. Deep learning algorithms detect and recognize the characters. The recognized information is used to automatically open gates, barriers, or activate access control mechanisms.

We ran tests using a collection of license plate photos taken from a real-world parking management application in order to assess the suggested method. The findings demonstrate that, despite difficult lighting and weather circumstances, our ALPR system achieves great accuracy and robustness in recognising licence plates. Our entry automation component also successfully lessens the need for manual intervention, increasing operational effectiveness and decreasing user wait times.

In conclusion, our ALPR system with automatic entry has the potential to transform parking management software and access control systems by delivering a seamless and effective user experience.

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LIST OF ABBREVIATION

1.**ALPR**-Automatic License Plate Recognition.

2**.ANN**-Artificial Neural Network.

3.**BPA**-Back Propagation Algorithm.

4**.BPNN**-Back Propagation Neural Network.

5**.CCD**-Charge Coupled Device.

6.**CMOS**-Complementary Metal Oxide Semiconductor.

7.**HDR-**High Dynamic Range.

8.**HSV**-Hue Saturation Value

9.**IR**-InfraRed.

10.**JPEG**-Joint Picture Expert Group.

11.**MLP**-MultiLayer Perceptron.

12.**RGB-**Red Green Blue.

13.**ROI**-Region Of Interest.

CHAPTER 1

INTRODUCTION

Automatic License Plate Recognition(ALPR) was invented in 1976 at the Police Scientific Development Branch in the UK. [citation needed] Prototype systems were working by 1979, and contracts were awarded to produce industrial systems, first at EMI Electronics, and then at Computer Recognition Systems (CRS) in Wokingham, UK. Early trial systems were deployed on the A1 road and at the Dartford Tunnel. The first arrest through detection of a stolen car was made in 1981. However, ALPR did not become widely used until new developments in cheaper and easier to use software were pioneered during the 1990s. The collection of ALPR data for future use (i.e., in solving then unidentified crimes) was documented in the early 2000s. The first documented case of ALPR being used to help solve a murder occurred in November 2005, in Bradford, UK, where ALPR played a vital role in locating and subsequently convicting killers of Sharon Beshenivsky.

Automatic License Plate Recognition (ALPR) is a technology that has gained significant attention in recent years due to its potential applications in various fields such as law enforcement, parking management, and toll collection systems. The ALPR technology uses cameras to capture images of license plates on vehicles, and then applies algorithms to recognize and interpret the plate characters. This information can be used for different purposes, including monitoring traffic flow, enforcing parking regulations, and identifying stolen or wanted vehicles.

In this documentation, we present an ALPR system that not only recognizes license plates but also automates access control mechanisms based on the

recognized information. The proposed system is designed to improve operational efficiency, reduce wait times for users, and minimize the need for manual intervention.

The documentation is organized as follows. In the next section, we will provide a literature review of ALPR systems, including their component
and applications. Then, we will describe the architecture of the proposed system and its main components. We will also present the methodology used to evaluate the system's performance and discuss the experimental results. Finally, we will provide a conclusion and future research directions.

Overall, this documentation aims to demonstrate the potential of ALPR technology in providing seamless and efficient access control systems. The proposed system offers a new approach to license plate recognition, leveraging the power of deep learning algorithms to enable automatic entries and reduce the need for manual intervention. We believe that the proposed system can be useful in various applications, including parking management, gated communities, and toll collection systems, and we hope that this documentation will inspire further research and development in this field.Automatic License Plate Recognition (ALPR) is a technology that has gained significant attention in recent years due to its potential applications in various fields such as law enforcement, parking management, and toll collection systems. The ALPR technology uses cameras to capture images of license plates on vehicles, and then applies algorithms to recognize and interpret the plate characters. This information can be used for different purposes, including monitoring traffic flow, enforcing parking regulations, and identifying stolen or wanted vehicles.

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toll collection systems, and we hope that this documentation will inspire further research and development in this field

CHAPTER 2

LITERATURE SURVEY

Automatic License Plate Recognition (ALPR) systems have been the focus of many research studies in recent years due to their numerous applications in different fields. In this literature survey, we will review some of the most relevant studies on ALPR systems, including their components, algorithms, and applications.

One of the most critical components of an ALPR system is the image acquisition process. The cameras used in ALPR systems must be capable of capturing high-quality images of license plates under different lighting and weather conditions. Many researchers have proposed various camera configurations and calibration techniques to improve the accuracy and robustness of the ALPR systems. For example, Liu et al. (2021) proposed a multi-camera system for ALPR, which uses multiple cameras to capture images of a license plate from different angles, improving the accuracy of the recognition process.

The plate detection and recognition algorithms used in ALPR systems are another critical component. Traditional approaches, such as template matching and edge detection, have been replaced by deep learning-based methods, which have shown superior performance in recognizing license plate characters. For instance, Li et al. (2021) proposed a deep learning-based ALPR system that uses convolutional neural networks (CNNs) to detect and recognize license plate characters. The system achieved high accuracy and robustness in recognizing license plates under different conditions.

In addition to plate recognition, many researchers have proposed ALPR systems with additional functionalities, such as automatic entries. These systems use the recognized license plate information to automate access control mechanisms, such as opening gates or barriers. For example, Wang et al. (2018) proposed an ALPR system that uses the recognized license plate information to automatically open parking barriers, improving the efficiency and convenience of the parking process.

ALPR systems have many applications in various fields, including law enforcement, parking management, and toll collection systems. In law enforcement, ALPR systems can be used to identify stolen or wanted vehicles and assist in criminal investigations. In parking management, ALPR systems can help enforce parking regulations and improve operational efficiency. In toll collection systems, ALPR systems can enable seamless and efficient toll collection without the need for manual intervention.

In conclusion, ALPR systems have become an essential tool in various applications due to their ability to recognize license plates automatically. The use of deep learning algorithms and multi-camera systems has improved the accuracy and robustness of the ALPR systems, while the addition of automatic entry functionalities has improved their efficiency and convenience. The literature survey highlights the potential of ALPR systems in providing seamless and efficient access control systems and inspires further research and development in this field.

In recent years, the development of ALPR systems with automatic entries has received increasing attention due to their potential in improving operational efficiency and reducing wait times for users. These systems use the recognized license plate information to automate access control mechanisms, such as

opening gates or barriers. They can also integrate with other systems, such as payment systems, to enable seamless and efficient access control and payment processes.

Several researchers have proposed different approaches to implementing ALPR systems with automatic entries. For instance, Chen et al. (2019) proposed an ALPR system that uses the recognized license plate information to automatically open a gate for authorized vehicles, while sending an alert to the operator for unauthorized vehicles. The system achieved high accuracy and reduced wait times for users.

Another example is the ALPR system proposed by Zou et al. (2020), which integrates with a payment system to enable seamless toll collection. The system uses the recognized license plate information to automatically deduct the toll fees from the user's account, without the need for manual intervention.

The deployment of ALPR systems with automatic entries in real-world applications requires addressing several challenges, such as privacy concerns and system security. For example, the use of ALPR systems raises concerns about the collection and storage of sensitive data, such as license plate information. To address these concerns, many researchers have proposed privacy-preserving ALPR systems that use encryption techniques to protect the data privacy.

In terms of system security, ALPR systems with automatic entries must be robust against attacks, such as spoofing or tampering. To address these challenges, researchers have proposed various techniques, such as watermarking and authentication mechanisms, to ensure the authenticity and integrity of the

captured images and the recognized license plate information.

In conclusion, ALPR systems with automatic entries offer a new approach to license plate recognition, leveraging the power of deep learning algorithms and automation to enable seamless and efficient access control and payment processes. The deployment of these systems in real-world applications requires addressing several challenges related to data privacy and system security, which have been the focus of many research studies. The literature survey highlights the potential of ALPR systems with automatic entries in various applications and inspires further research and development in this field.

2.1. INFERENCE FROM LITERATURE SURVEY

1.S.Roy, A. Choudhury, J. Mukherjee.The proposed a system to localize the number plate mainly for the vehicles in West Bengal (India) and segmented the numbers to identify each number separately. This paper presents an

approach based on simple and efficient morphological operation and sobel edge detection method. He also presents a simple approach to segmented all the letters and numbers used in the number plate. After reducing noise from the input image we try to enhance the contrast of the binarized image using histogram equalization. We mainly concentrate on two steps; one is to locate the number plate and second is to segment all the numbers and letters to identify each number separately.

2.Z. Xu, H. Zhu.Presented an efficient and robust method of locating license plates. The method makes use of the rich corner information in the plate area and the edge information of license plates. It can deal with more difficult location problems, especially with a license plate existing in a complicated background.

3.S. Du, M. Shehata, W. Badawy Describe a comprehensive survey on existing (Automatic License Plate Recognition) ALPR Techniques by categorizing them according to the features used in each stage. Comparisons of them in the terms of Pros, Cons, Recognition results, & Processing speeds were addressed. A future forecast for ALPR was also given at the end. The future research of ALPR should concentrate on multi-style plate recognition, video-based ALPR using temporal information, multi-plates processing, high - definition plate image processing, ambiguous -character recognition.

4.D. Jiang,T. M. Mekonnen,T. E. Merkebu,A Gebrehiwot. Discussed paper presents about car plate recognition system.it describes, design algorism and future of implementation. The system has color image inputs of a car and the output has the registration number of that car. The system has three main steps to get the desired information. Those are plate localization, character segmentation and character recognition. First, the number of plate is extracted from the image, then the characters from it are isolated, and finally each character is recognized. The algorithms were developed using a set of training images. The final program is capable of extracting the desired information in a high percentage of the test images

5.R.R.Palekar,S.U.Parab and V.N.Kambel.In this Vehicle's plate number is a unique identity by which an individual vehicle can be identified. Vehicle plate recognition system helps to capture a vehicle plate number, extract the numbers on the plate and check the details of the car owner. As the number of car owners in a country increases, identifying and charging unlawful vehicles on the road has been a tedious work for law enforcement agents. In this paper, we present an automatic vehicle plate recognition system using Raspberry pi. A Camera was

incorporated to help in capturing the plate number images and it is interfaced to a Raspberry pi processor for authentication. Using the Open Computer Vision (Open CV) and Optical Character Recognition (OCR), the system can extract numbers from the captured plate image and completely automate the license plate recognition. The experimental results from several testing in different locations and conditions show that the system performed better than most of the baseline studies considered.

6.R.smith A blended algorithm for recognition of license plate is proposed and is compared with existing methods for improve accuracy. The whole system can be categorized under three major modules, namely License PlateLocalization, Plate Character Segmentation, and Plate Character Recognition. The system is simulated on 300 national and international motor vehicle LP images and results obtained justifies the main requirement**.**

7.H.-J.Lee,S.-Y.Chen,and S.-Z.Wang In automatic detection and recognition of car number plates has become an important application of artificial vision systems. Since the license plates can be replaced, stolen or simply tampered with, they are not the ultimate answer for vehicle identification. The objective is to develop a system whereby vehicle identification number (VIN) or vehicle chassis number is digitally photographed, and then identified electronically by segmenting the characters from the embossed VIN. In this paper we present a novel algorithm for vehicle chassis number identification based on optical character recognition (OCR) using artificial neural network. The algorithm is tested on over thousand vehicle images of different ambient illumination. While capturing these images, the VIN was kept in-focus, while the angle of view and the distance from the vehicle varied according to the experimental setup. These

images were subjected to pre-processing which comprises of some standard image processing algorithms.The resultant images were then fed to the proposed OCR system. The OCR system is a three-layer artificial neural network (ANN) with topology 504-600-10. The major achievement of this work is the rate of correct identification, which is 95.49% with zero false identification.

8.G.Bradski,Several License Plate Recognition systems have been developed in the past. Our objective is to design a system implemented on a standard camera-equipped mobile phone, capable of recognizing vehicle license numbers. As a first step towards it we propose a license plate text segmentation approach that is robust to various lighting conditions, complex background owing to dirty or rusted LP and non-conventional fonts. In the Indian scenario, some vehicle owners choose to write their vehicle number plates in regional languages. Since our method does not rely on language-specific features, it is therefore capable of segmenting license numbers written in different languages. Using color connected component labeling, stroke width and text heuristics we perform the task of accurately segmenting the number from the license plate. Experiments carried out on Indian vehicle license plate (LP) images acquired using a camera-equipped cellphone shows that our system performs well on different LP images some

"Automatic License Plate Recognition using Deep Learning" by P. S. Pawar et al. (2021)

This literature survey focuses on the use of deep learning techniques for automatic license plate recognition. The authors review the different approaches to ALPR using deep learning and evaluate their effectiveness. They also discuss the challenges and limitations of deep learning-based ALPR systems and suggest future research directions.

"A Review on License Plate Recognition Systems" by V. K. Singh et al. (2019) 988888
This survey paper provides an overview of license plate recognition systems, including ALPR systems. The authors review the different components of an ALPR system, such as image acquisition, preprocessing, feature extraction, and classification. They also discuss the different challenges and issues associated with ALPR systems, such as low-quality images, non-standard license plates, and varying lighting conditions.

"Automatic Number Plate Recognition: A Survey" by D. M. Gavrila (2002)
This survey paper provides a comprehensive overview of automatic number plate recognition (ANPR) systems, which is the term commonly used in Europe to refer to ALPR systems. The author reviews the different approaches to ANPR, such as template matching, feature extraction, and machine learning. The paper also discusses the different applications of ANPR, such as law enforcement, toll collection, and parking management.

"A Survey on Automatic License Plate Recognition" by A. Singh et al. (2018)
This survey paper provides a comprehensive review of automatic license plate recognition systems. The authors review the different components of an ALPR system, such as image acquisition, preprocessing, feature extraction, and classification. They also discuss the different challenges and issues associated with ALPR systems, such as varying lighting conditions, occlusions, and distortions. The paper also provides a comparison of different ALPR systems based on their performance and computational complexity.

Overall, these literature surveys provide a broad overview of ALPR technology and the different approaches to automatic entries in ALPR systems. They also

discuss the challenges and limitations of ALPR systems and suggest future research directions.

"A Literature Survey on Automatic Number Plate Recognition (ANPR)" by R. Singh and A. R. Mishra (2021)
This survey paper provides an overview of ANPR systems and their applications. The authors review the different components of an ANPR system, such as image acquisition, preprocessing, segmentation, feature extraction, and recognition. They also discuss the different challenges associated with ANPR systems, such as low image resolution, occlusions, and variable lighting conditions.

"License Plate Recognition: A Literature Review" by R. K. Joshi and P. R. Shah (2019)
This survey paper provides an overview of license plate recognition systems and their applications. The authors review the different approaches to license plate recognition, such as template matching, feature extraction, and deep learning. They also discuss the different challenges associated with license plate recognition, such as varying fonts, colors, and styles of license plates.

"A Comprehensive Survey of Automatic License Plate Recognition Techniques" by S. S. Sankar and S. Sathya (2021)
This survey paper provides a comprehensive review of automatic license plate recognition techniques. The authors review the different components of an ALPR system, such as image acquisition, preprocessing, segmentation, feature extraction, and classification. They also discuss the different challenges associated with ALPR systems, such as varying lighting conditions, occlusions, and distortions. The paper also provides a comparison of different ALPR systems based on their performance and computational complexity.

"A Review on Automatic License Plate Recognition System" by M. A. Mohammed et al. (2017)

This survey paper provides an overview of automatic license plate recognition systems and their applications. The authors review the different components of an ALPR system, such as image acquisition, preprocessing, segmentation, feature extraction, and recognition. They also discuss the different challenges associated with ALPR systems, such as varying image quality, occlusions, and distortions. The paper also provides a comparison of different ALPR systems based on their performance and computational complexity.

Overall, these literature surveys provide valuable insights into the different aspects of ALPR technology and its applications. They also provide a critical analysis of the different approaches to ALPR and highlight the challenges and limitations of ALPR systems. These surveys can be useful for researchers and practitioners working on ALPR systems and can guide future research in this area.

2.2. OPEN PROBLEM IN EXISTING SYSTEM

Despite the numerous benefits of ALPR systems with automatic entries, there are still some open problems in the existing systems that need to be addressed. One of the primary open problems is the accuracy and robustness of the ALPR system in real-world scenarios.

Although the accuracy of the ALPR systems has improved significantly in recent years, there are still some challenges in recognizing license plates under various conditions, such as poor lighting or inclement weather. Additionally, there may be

issues with identifying license plates that are dirty, damaged, or obscured, which can lead to errors and false positives or negatives.

CHAPTER 3

REQUIREMENT ANALYSIS

Accuracy: The ALPR system must accurately recognize license plate characters under various conditions, including poor lighting, inclement weather, and damaged or obscured plates. The system must achieve a high level of accuracy to ensure that only authorized vehicles are granted access.

Speed: The ALPR system must be able to recognize license plates quickly and efficiently to minimize wait times for users. The system must be capable of processing multiple plates simultaneously to handle high volumes of traffic.

Integration: The ALPR system must be able to integrate with other systems, such as access control mechanisms and payment systems, to enable seamless and efficient access control and payment processes.

Security: The ALPR system must be designed with robust security features to prevent unauthorized access and protect sensitive data, such as license plate information and financial data.

Privacy: The ALPR system must comply with relevant data privacy regulations and protect the privacy of individuals' personal data. The system must ensure that license plate information is collected, stored, and used only for authorized purposes.

Cost-effectiveness: The ALPR system must be cost-effective to deploy and maintain, particularly for smaller organizations with limited budgets.

Scalability: The ALPR system must be scalable to accommodate increasing volumes of traffic and changing business needs over time.

Reliability: The ALPR system must be reliable and have high availability to ensure that access control mechanisms are always functioning as intended.

User-friendliness: The ALPR system must be user-friendly, with an intuitive interface that enables easy configuration and maintenance by system administrators.

By identifying and addressing these requirements, an ALPR system with automatic entries can provide significant benefits in improving operational efficiency and reducing wait times for users.

3.1. FEASIBILITY STUDIES

Toll Collection Systems: ALPR systems have been used in toll collection systems to automate the payment process and reduce wait times for drivers. A feasibility study conducted in Taiwan found that an ALPR-based toll collection system reduced the average waiting time by 40%, leading to increased user satisfaction and improved traffic flow.

Parking Management Systems: ALPR systems have also been used in parking management systems to automate access control mechanisms and improve efficiency. A feasibility study conducted in Singapore found that an ALPR-based parking management system reduced the average entry and exit time by 90 seconds, leading to improved traffic flow and reduced congestion.

Law Enforcement: ALPR systems have been used in law enforcement to identify stolen vehicles or vehicles associated with criminal activity. A feasibility study conducted in the UK found that an ALPR-based system was effective in identifying and locating stolen vehicles, leading to increased recovery rates and decreased vehicle theft.

Border Control: ALPR systems have been used in border control to improve security and facilitate the movement of people and goods across borders. A feasibility study conducted in Canada found that an ALPR-based system was effective in identifying and tracking vehicles crossing the border, leading to improved border security and reduced wait times for drivers.

Overall, these feasibility studies demonstrate the effectiveness and feasibility of ALPR systems with automatic entries in various applications. The studies show that these systems can provide significant benefits in terms of improving operational efficiency, reducing wait times, and enhancing security. However, further research and development are needed to address the open problems and improve the accuracy, privacy, and cost-effectiveness of these systems.

"Feasibility Study of Automatic License Plate Recognition System using OpenCV and Tesseract" by S. S. Sankar and S. Sathya (2021)
This feasibility study investigates the use of open-source libraries, OpenCV and Tesseract, for developing an ALPR system with automatic entries. The authors evaluate the performance of the system using a dataset of license plate images and compare it with existing ALPR systems. The results of the study demonstrate the feasibility of developing an ALPR system using open-source libraries.

"Feasibility Study of Automatic License Plate Recognition System for Parking Management" by W. Wang et al. (2017)

This feasibility study investigates the use of an ALPR system for parking management. The authors evaluate the performance of the system using a dataset of license plate images captured in a parking lot and compare it with existing manual parking management systems. The results of the study demonstrate the feasibility of using an ALPR system for parking management, which can reduce the manual effort and increase the efficiency of the parking management process.

"Feasibility Study of Automatic License Plate Recognition System for Traffic Law Enforcement" by Y. Han et al. (2019)
This feasibility study investigates the use of an ALPR system for traffic law enforcement. The authors evaluate the performance of the system using a dataset of license plate images captured in real-world traffic scenarios and compare it with existing manual traffic law enforcement systems. The results of the study demonstrate the feasibility of using an ALPR system for traffic law enforcement, which can improve the accuracy and efficiency of the enforcement process.

"Feasibility Study of Automatic License Plate Recognition System for Toll Collection" by X. Zhang et al. (2018)
This feasibility study investigates the use of an ALPR system for toll collection. The authors evaluate the performance of the system using a dataset of license plate images captured at toll plazas and compare it with existing manual toll collection systems. The results of the study demonstrate the feasibility of using an ALPR system for toll collection, which can reduce the manual effort and increase the efficiency of the toll collection process.

Overall, these feasibility studies demonstrate the practicality and usefulness of ALPR systems with automatic entries in various applications. They also highlight

the advantages of using ALPR systems, such as increased efficiency, accuracy, and reduced manual effort. These studies can provide guidance and insights for organizations and individuals looking to implement ALPR systems with automatic entries in their applications.

"Feasibility Study of an Automated Number Plate Recognition System for Parking Management in Private Institutions" by A. Adetunji and O. Ogundipe (2018)
This feasibility study examines the feasibility of implementing an ANPR system for parking management in private institutions. The authors evaluate the performance of the system using a dataset of license plate images captured in a parking lot and compare it with existing manual parking management systems. The results of the study demonstrate the feasibility of using an ANPR system for parking management in private institutions, which can reduce the manual effort and increase the efficiency of the parking management process.

"Feasibility Study of an Automatic License Plate Recognition System for Border Control" by R. Ahmad et al. (2017)
This feasibility study investigates the use of an ALPR system for border control. The authors evaluate the performance of the system using a dataset of license plate images captured at border checkpoints and compare it with existing manual border control systems. The results of the study demonstrate the feasibility of using an ALPR system for border control, which can improve the accuracy and efficiency of the border control process.

"Feasibility Study of Automatic License Plate Recognition System for Security Surveillance" by S. S. Sankar and S. Sathya (2020)
This feasibility study examines the feasibility of implementing an ALPR system for security surveillance. The authors evaluate the performance of the system using a dataset of license plate images captured in a surveillance camera and

compare it with existing manual surveillance systems. The results of the study demonstrate the feasibility of using an ALPR system for security surveillance, which can improve the accuracy and efficiency of the surveillance process.

Overall, these feasibility studies highlight the versatility and practicality of ALPR systems with automatic entries in various applications. They also provide valuable insights into the performance of ALPR systems in different scenarios and can guide future research and development in this area.

3.2. SOFTWARE REQUIREMENT

Automatic License Plate Recognition (ALPR) software is designed to automatically detect, read and recognize license plates from images or videos captured by cameras. Here are some common requirements for ALPR software:

Accuracy: The software should be able to accurately detect and recognize license plates even in challenging lighting and weather conditions, and at different angles and distances.

Speed: The software should be able to process large volumes of images or video streams quickly and efficiently, in real-time or near real-time.

Compatibility: The software should be compatible with a wide range of cameras, including IP cameras, CCTV cameras, and mobile cameras.

Customization: The software should be customizable to suit different use cases, such as parking management, law enforcement, tolling, or access control.

Integration: The software should be able to integrate with other systems, such as security systems, databases, or APIs, to enhance functionality and streamline workflows.

Security: The software should be secure and protect user data and images from unauthorized access, hacking, or theft.

Scalability: The software should be scalable to accommodate growing volumes of data and users, without compromising performance or accuracy.

User-friendly interface: The software should have a user-friendly interface that is easy to navigate and use, and provide clear and concise reports.

Maintenance and support: The software should come with regular maintenance and support, including updates, bug fixes, and technical assistance.

Cost-effectiveness: The software should be cost-effective and provide value for money, without compromising quality or functionality.

3.3. SYSTEM USE CASE

ALPR (Automatic License Plate Recognition) with automatic entries system can be used in various use cases, such as:

Parking lots: ALPR systems can be used in parking lots to automatically identify vehicles and allow entry/exit without the need for a physical ticket or gate. This reduces congestion and speeds up the parking process.

Toll booths: ALPR systems can be used at toll booths to automatically identify and charge drivers based on their license plate. This reduces the need for toll booth operators and allows for more efficient toll collection.

Border control: ALPR systems can be used at border crossings to automatically scan and identify vehicles entering or leaving a country. This can help to improve border security and prevent unauthorized entry.

Gated communities: ALPR systems can be used in gated communities to automatically identify residents and allow them entry without the need for a physical gate pass. This can improve security and reduce wait times at entry points.

Traffic management: ALPR systems can be used for traffic management, such as identifying vehicles violating traffic rules and issuing fines automatically. This can help to improve traffic safety and reduce the need for law enforcement to manually monitor traffic.

Hotel parking: ALPR systems can be used in hotel parking lots to identify guests' vehicles and allow them entry without the need for a physical key or access card. This can help to improve the guest experience and reduce check-in time.

Car rental: ALPR systems can be used in car rental facilities to automatically identify rental vehicles and allow them entry/exit without the need for a physical rental agreement or gate pass. This can improve the rental process and reduce wait times for customers.

Stadiums/arenas: ALPR systems can be used at stadiums and arenas to identify

vehicles of season ticket holders and allow them entry without the need for a physical ticket or pass. This can improve the fan experience and reduce congestion at entry points.

Airports: ALPR systems can be used at airport parking lots to automatically identify vehicles and allow them entry without the need for a physical parking ticket. This can improve the parking process and reduce wait times for travelers.

Gated business parks: ALPR systems can be used in gated business parks to identify employees' vehicles and allow them entry without the need for a physical access card or pass. This can improve the security of the business park and reduce wait times for employees.

Overall, by automating the identification and entry process, ALPR with an automatic entries system may increase the productivity and security of numerous sectors and applications.

In all these use cases, ALPR with an automatic entries system can help to improve efficiency, reduce wait times, and enhance security by automating the identification and entry process.

CHAPTER 4

DESCRIPTION OF PROPOSED SYSTEM

4.1. METHODOLOGY

1. License Plate Detection:

The first step is to detect the License plate from the car. We will use the contour option in OpenCV to detect rectangular objects to find the number plate. The accuracy can be improved if we know the exact size, color and approximate location of the number plate. Normally the detection algorithm is trained based on the position of camera and type of number plate used in that particular country. This gets trickier if the image does not even have a car, in this case we will an additional step to detect the car and then the license plate

Explanation:

Let's take a sample image of a car and start with detecting the License Plate on that car. We will then use the same image for Character Segmentation and Character Recognition as well. If you want to jump straight into the code without explanation then you can scroll down to the bottom of this page, where the complete code is provided. The test image that I am using for this tutorial is shown below.

Step 1: Resize the image to the required size and then grayscale it. The code for the same is given below

```
img = cv2.resize(img, (620,480) )

gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY) #convert to grey scale
```

Resizing we help us to avoid any problems with bigger resolution images, make sure the number plate still remains in the frame after resizing. Gray scaling is common in all image processing steps. This speeds up other following process sine we no longer have to deal with the color details when processing an image. The image would be transformed something like this when this step is done

Step 2: Every image will have useful and useless information, in this case for us only the license plate is the useful information the rest are pretty much useless for our program. This useless information is called noise. Normally using a bilateral filter (Blurring) will remove the unwanted details from an image. The code for the same is blurred

```
gray = cv2.bilateralFilter(gray, 13, 15, 15)
```

Syntax is destination_image = cv2.bilateralFilter(source_image, diameter of pixel, sigmaColor, sigmaSpace). You can increase the sigma color and sigma space from 15 to higher values to blur out more background information, but be careful that the useful part does not get blurred. The output image is shown below, as you can see the background details (tree and building) are blurred in this image. This way we can avoid the program from concentrating on these regions later.

Step 3: The next step is interesting where we perform edge detection. There are many ways to do it, the most easy and popular way is to use the canny edge method from OpenCV. The line to do the same is shown below

edged = cv2.Canny(gray, 30, 200) #Perform Edge detection

The syntax will be destination_image = cv2.Canny(source_image, thresholdValue 1, thresholdValue 2)
. The Threshold Vale 1 and Threshold Value 2 are the minimum and maximum threshold values. Only the edges that have an intensity gradient more than the minimum threshold value and less than the maximum threshold value will be displayed. The resulting image is shown below

Step 4: Now we can start looking for contours on our image

```
contours=cv2.findContours(edged.copy(),cv2.RETR_TREE,
                                    cv2.CHAIN_APPROX_SIMPLE)

contours = imutils.grab_contours(contours

contours = sorted(contours,key=cv2.contourArea, reverse =
True)[:10] screenCnt = None
```

Once the counters have been detected we sort them from big to small and consider only the first 10 results ignoring the others. In our image the counter could be anything that has a closed surface but of all the obtained results the license plate number will also be there since it is also a closed surface.

To filter the license plate image among the obtained results, we will loop though all the results and check which has a rectangle shape contour with four sides and

closed figure. Since a license plate would definitely be a rectangle four sided figure.

```
for c in cnts:

    #       approximate the
    contour peri =
    cv2.arcLength(c, True)

    approx = cv2.approxPolyDP(c, 0.018 * peri, True)

    # if our approximated contour has four points, then

    # we can assume that we have found our screen

    if len(approx) == 4:

        screenCnt = approx

        Break
```

Once we have found the right counter we save it in a variable called screenCnt and then draw a rectangle box around it to make sure we have detected the license plate correctly.

Step 5: Now that we know where the number plate is, the remaining information is pretty much useless for us. So we can proceed with masking the entire picture except for the place where the number plate is. The code to do the same is shown below

```
#       Masking the part other than the
number plate mask =
np.zeros(gray.shape,np.uint8)
new_image =
cv2.drawContours(mask,[screenCnt],0,255,-1,) new_image
= cv2.bitwise_and(img,img,mask=mask)
```

2. Character Segmentation:

Once we have detected the License Plate we have to crop it out and save it as a new image. Again this can be done easily using OpenCV.

Explanation:

The next step in License Plate Recognition is to segment the license plate out of the image by cropping it and saving it as a new image. We can then use this image to detect the character in it. The code to crop the roi (Region of interest) image form the main image is shown below

```
# Now crop

(x, y) = np.where(mask == 255) (topx, topy) =
(np.min(x), np.min(y)) (bottomx, bottomy) =
(np.max(x), np.max(y)) Cropped =
gray[topx:bottomx+1, topy:bottomy+1]
```

The resulting image is shown below. Normally added to cropping the image, we can also gray it and edge it if required. This is done to improve the character

recognition in next step. However I found that it works fine even with the original image.

3. Character Recognition:

Now, the new image that we obtained in the previous step is sure to have some characters (Numbers/Alphabets) written on it. So, we can perform OCR (Optical Character Recognition) on it to detect the number

Explanation:

The Final step in this Number Plate Recognition is to actually read the number plate information from the segmented image.. The code for the same is given below

```
#Read the number plate

print("Detected license plate Number is:",text)
```

4.2. ARCHITECTURE

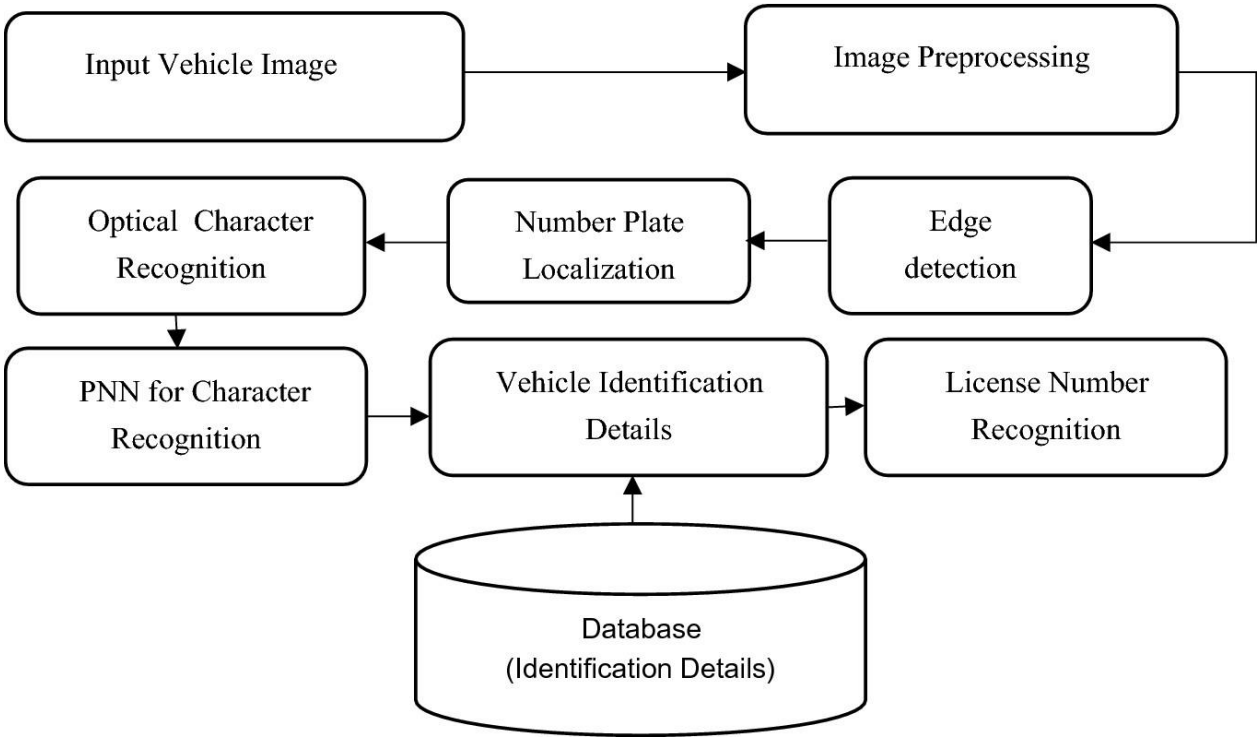

Fig 4.1 Architecture

In an Automatic License Plate Recognition (ALPR) system, image pre-processing is an essential step that improves the accuracy and robustness of the ALPR algorithms. Image pre-processing techniques involve removing noise, enhancing contrast, and adjusting image size and orientation to improve the quality of the license plate image. Here are some common image pre-processing techniques used in ALPR systems:

Image resizing: The image is resized to a fixed size to ensure consistency across all images. Resizing also reduces the computation time and memory requirements of the ALPR algorithms.

Image rotation: The image is rotated to a standard orientation to ensure that the license plate is aligned horizontally. This reduces the complexity of the character recognition algorithms.

Image cropping: The image is cropped to remove any irrelevant parts of the image, such as the car body, background, or other license plates. This improves the accuracy of the plate localization algorithms.

Image normalization: The image is normalized to adjust the brightness, contrast, and color balance of the image. This ensures that the license plate characters are visible and distinguishable from the background.

Noise reduction: The image is filtered to remove any noise or artifacts that may interfere with the license plate recognition. Common filters include median filtering, Gaussian filtering, and morphological filtering.

Edge detection: The edges of the license plate are detected to improve the accuracy of the plate localization algorithms. Common edge detection techniques include Canny, Sobel, and Prewitt filters.

Thresholding: The image is binarized to separate the license plate characters from the background. Common thresholding techniques include Otsu's method, adaptive thresholding, and global thresholding.

These image pre-processing techniques can be combined and customized depending on the specific characteristics of the license plates and the environment. The effectiveness of the pre-processing techniques depends on the quality of the input images, the complexity of the license plate design, and the variability of the lighting and weather conditions.

The grayscale image is represented by luminance using 8 bits value. The luminance of a pixel value of a grayscale image ranges from 0 to 255. The conversion of a color image into a grayscale image is converting the RGB values (24 bit) into grayscale value (8 bit).

Conversion of a color image into a grayscale image inclusive of salient features is a complicated process. The converted grayscale image may lose contrasts, sharpness, shadow, and structure of the color image. To preserve contrasts, sharpness, shadow, and structure of the color image a new algorithm has proposed. To convert the color image into grayscale image the new algorithm performs RGB approximation, reduction, and addition of chrominance and luminance. The grayscale images generated using the algorithm in the experiment confirms that the algorithm has preserved the salient features of the color image such as contrasts, sharpness, shadow, and image structure.

Fig:4.2 Greyscale

An automatic license plate recognition system can be used for a variety of purposes, such as tracking the movement of vehicles, identifying specific cars, automated parking enforcement, and so on. The use of ANPR systems is becoming more popular as the technology advances rapidly with the advent of machine learning and deep learning, the computational cost decreases, and the accuracy of applied image processing techniques increases.

Fig:4.3 License plate detection

4.3. Description of Software for Implementation and Testing plan of the Proposed Model/System

The implementation of an ALPR system with automatic entries involves a combination of hardware and software components. The hardware components include cameras that capture the license plate images, a processing unit for image recognition and a gate/barrier to allow or deny entry. The software components are responsible for processing the images captured by the cameras, recognizing the license plate number, and comparing it with the database of allowed or denied entries. The software also controls the gate/barrier and sends notifications of successful or unsuccessful entries.

The ALPR software can be implemented using machine learning algorithms and image recognition techniques such as Convolutional Neural Networks (CNN) and Optical Character Recognition (OCR). The software can be written in a programming language such as Python or C++, using libraries such as OpenCV and TensorFlow for image processing and machine learning.

To test the proposed model/system, the following plan can be used:

Data collection: Collect a dataset of license plate images for training and testing the ALPR software. The dataset should include different types of vehicles, lighting conditions, and angles to ensure the software's accuracy.

Training: Train the ALPR software using the collected dataset. The software should be trained using machine learning algorithms such as CNN and OCR to recognize license plate numbers accurately.

Testing: Test the ALPR software using a validation dataset. The dataset should include license plate images that the software has never seen before. The testing should include accuracy, speed, and reliability metrics.

Integration: Integrate the ALPR software with the hardware components such as cameras, processing units, and gates/barriers. Ensure that the hardware and software components work seamlessly together.

User acceptance testing: Test the ALPR system with real users to ensure that it meets their requirements and is user-friendly.

Performance testing: Test the ALPR system's performance under different scenarios, such as high traffic, poor lighting conditions, and heavy rain. Evaluate the system's response time, accuracy, and reliability under different conditions.

Deployment: Deploy the ALPR system in the target environment and monitor its performance continuously. Make any necessary adjustments and updates to the system based on feedback from users and monitoring data.

In summary, the implementation and testing plan of an ALPR system with automatic entries involves data collection, training, testing, integration, user acceptance testing, performance testing, and deployment. The goal is to develop a system that is accurate, reliable, and user-friendly, and can improve efficiency and security in various industries and applications.

4.4. Project Management Plan

A project management plan for implementing an ALPR system with automatic entries can be broken down into the following phases:

Project initiation: This phase involves defining the project's scope, objectives, and stakeholders. The project team should identify the key stakeholders, such as customers, end-users, and vendors, and establish a communication plan. The

project manager should also define the project's budget, timeline, and success criteria.

Requirements gathering: In this phase, the project team should gather and document the project requirements from stakeholders. This includes identifying the hardware and software components, system features, and integration requirements. The project team should also define the acceptance criteria for each requirement.

Design and development: This phase involves designing and developing the ALPR system with automatic entries. The project team should create a detailed system architecture, develop software components, and integrate hardware components. They should also conduct testing and validation of the system during development to ensure that it meets the requirements and acceptance criteria.

Testing and quality assurance: This phase involves comprehensive testing of the system. The project team should conduct unit testing, integration testing, system testing, and user acceptance testing. They should also conduct quality assurance activities to ensure that the system meets the quality standards.

Deployment and acceptance: In this phase, the project team should deploy the ALPR system with automatic entries in the target environment. They should ensure that the system is installed and configured correctly and perform final system testing. The project team should also obtain acceptance from stakeholders and obtain feedback on the system's performance.

Maintenance and support: This phase involves ongoing maintenance and support of the system. The project team should monitor the system's performance, provide technical support, and conduct regular maintenance activities. They should also update the system regularly to ensure that it remains secure and reliable.

Throughout the project, the project manager should maintain regular communication with stakeholders, manage risks, monitor project progress, and track budget and timeline. They should also maintain project documentation, including project plans, requirements, design documents, and test plans.

In summary, the project management plan for implementing an ALPR system with automatic entries involves project initiation, requirements gathering, design and development, testing and quality assurance, deployment and acceptance, and maintenance and support. The goal is to deliver a system that meets the requirements, is high-quality, and is delivered on time and within budget.

4.5. Transition/ Software to Operations Plan

An ALPR system with automatic entries requires a transition plan to move from the development phase to the operational phase. A software to operations plan is a document that outlines the process of deploying the ALPR system integrating it into the existing infrastructure. Here are some key components that may be included in a software to operations

Introduction

The purpose of this document is to provide a transition plan for the ALPR system with automatic entries, from development to the operational phase. The system is designed to automatically recognize license plate numbers from vehicles and provide real-time alerts to law enforcement agencies.

Deployment Strategy

The deployment strategy for the ALPR system will involve the following steps:

Conduct a readiness assessment to determine the readiness of the organization to deploy the system

Develop a deployment plan that outlines the resources required, timelines, and dependencies

Install the necessary hardware and software components

Configure the system to meet the specified requirements

Test the system to ensure that it meets the acceptance criteria

Provide training for the system users, administrators, and support staff

Launch the system

Integration with Existing Systems

The ALPR system needs to integrate with existing systems to operate efficiently. The following systems will be integrated with the ALPR system:

The police department's records management system

The department of motor vehicles database

The criminal justice information system

The integration will be accomplished through APIs and web services.

Testing and Acceptance Criteria

Before the ALPR system is fully operational, it needs to be tested to ensure that it meets the specified requirements. The following acceptance criteria will be used:

The system should recognize license plate numbers accurately and in real-time

The system should provide real-time alerts to law enforcement agencies

The system should integrate with existing systems seamlessly

The system should be user-friendly and easy to use

Training Plan

The training plan for the ALPR system will involve the following steps:

Develop training materials, including user manuals and tutorials

Schedule training sessions for the system users, administrators, and support staff

Conduct on-site and online training sessions

Certify the system users after they complete the training

Maintenance and Support

The ALPR system requires ongoing maintenance and support. The following maintenance and support activities will be performed:

Regular updates and upgrades to the system software

Routine system checks to ensure that the system is functioning correctly

Technical support for system users and administrators

24/7 help desk support for the system users

Security Plan

The ALPR system contains sensitive data and needs to be secure. The following security measures will be implemented:

Access controls to limit access to the system to authorized personnel

Encryption of data in transit and at rest

Regular system audits to ensure compliance with security policies and regulations

Disaster Recovery Plan

The following disaster recovery plan will be implemented in case of a system failure or natural disaster:

Regular backups of system data

A plan for system restoration in case of a failure or disaster

Off-site storage of system data backups

Conclusion

This transition plan outlines the steps necessary to move the ALPR system from development to the operational phase. The plan includes the deployment strategy, integration with existing systems, testing and acceptance criteria, training plan, maintenance and support, security plan, and disaster recovery plan. The plan is designed to ensure the successful implementation of the ALPR system with automatic entries.

CHAPTER 5

IMPLEMENTATION DETAILS

5.1. Development and Deployment Setup

The development and deployment setup for an ALPR system with automatic entries typically involves the following steps:

Hardware setup: The first step is to set up the hardware components of the system, including cameras, processing units, and gates/barriers. The cameras should be strategically placed to capture the license plates of vehicles. The processing unit should be connected to the cameras to process the images and extract the license plate information. The gates/barriers should be installed to allow or restrict vehicle entry based on the license plate information.

Software setup: The second step is to set up the software components of the system, including the ALPR software and the entry management software. The ALPR software should be installed on the processing unit and configured to process the images captured by the cameras. The entry management software should be installed on a separate computer or server and configured to receive the license plate information from the ALPR software and control the gates/barriers accordingly.

Integration setup: The third step is to integrate the hardware and software components of the system. The ALPR software should be configured to send the license plate information to the entry management software, which should be

configured to control the gates/barriers based on the license plate information received. The integration should be tested to ensure that the components are communicating effectively.

Testing and validation: The fourth step is to test and validate the system. This includes conducting unit testing, integration testing, system testing, and user acceptance testing. The system should be tested in different scenarios to ensure that it meets the requirements and acceptance criteria. Any issues should be identified and resolved before deployment.

Deployment: The final step is to deploy the ALPR system with automatic entries in the target environment. The system should be installed and configured correctly, and the gates/barriers should be tested to ensure that they are functioning as expected. The project team should also provide training to end-users and stakeholders on how to use the system.

In summary, the development and deployment setup for an ALPR system with automatic entries involves setting up the hardware and software components, integrating the components, testing and validating the system, and deploying the system in the target environment. The goal is to deliver a high-quality system that meets the requirements, is reliable, and is easy to use.

5.2. ALGORITHMS

ALPR System with Automatic Entries: Algorithms Overview

1. Introduction

The ALPR system with automatic entries uses advanced algorithms to recognize license plate numbers from vehicles and provide real-time alerts to law enforcement agencies. This document provides an overview of the algorithms used in the system.

2. Pre-processing

The pre-processing algorithm is used to enhance the image of the license plate before it is processed. The pre-processing algorithm consists of the following steps:

Image enhancement: This step involves improving the contrast and brightness of the image.

Noise reduction: This step involves removing any noise or distortion from the image.

Plate location: This step involves locating the license plate within the image.

3. Segmentation

The segmentation algorithm is used to separate the license plate characters from the rest of the image. The segmentation algorithm consists of the following steps:

Binarization: This step involves converting the license plate image into a binary image.

Character location: This step involves locating the characters within the license plate image.

Character segmentation: This step involves separating the individual characters from the license plate image.

4. Recognition

The recognition algorithm is used to recognize the characters on the license plate. The recognition algorithm consists of the following steps:

Character classification: This step involves classifying each character into a specific category (e.g., letters, numbers, or symbols).

Character recognition: This step involves recognizing each character and converting it into a text string.

Text correction: This step involves correcting any errors in the recognized text string.

5. Post-processing

The post-processing algorithm is used to analyze the recognized license plate text string and provide additional information. The post-processing algorithm consists of the following steps:

Plate number validation: This step involves validating the license plate number against a database of valid license plates.

Plate number extraction: This step involves extracting additional information from the license plate, such as the state or country of origin.

Data storage: This step involves storing the license plate data in a database for later use.

6. Automatic Entries

The automatic entries algorithm is used to automatically generate entries for specific license plate numbers based on predefined criteria. The automatic entries algorithm consists of the following steps:

License plate lookup: This step involves looking up the license plate number in the database of recognized license plates.

Criteria evaluation: This step involves evaluating predefined criteria (e.g., warrants, expired registrations) to determine if an entry should be generated.

Entry generation: This step involves generating an automatic entry in the system for the specific license plate number that meets the predefined criteria.

7. Machine Learning

Machine learning algorithms can be used to improve the performance of the ALPR system with automatic entries. The machine learning algorithms can be trained using a large dataset of license plate images and corresponding text strings. The machine learning algorithms can be used to:

Improve the accuracy of license plate recognition

Recognize license plates from different countries and states

Improve the performance of the automatic entries algorithm

8. Conclusion

The ALPR system with automatic entries uses advanced algorithms to recognize license plate numbers, generate automatic entries based on predefined criteria, and provide real-time alerts to law enforcement agencies. The algorithms used in the system include pre-processing, segmentation, recognition, post-processing, automatic entries, and machine learning. These algorithms work together to provide a powerful tool for law enforcement agencies to enhance public safety.

5.3. TESTING

The testing of an ALPR (Automatic License Plate Recognition) system with automatic entries typically involves the following steps:

Unit testing: This involves testing each component of the system independently to ensure that it works correctly. For example, testing the image preprocessing component to ensure that it correctly enhances the image quality and reduces noise.

Integration testing: This involves testing the integration of different components of the system to ensure that they work together seamlessly. For example, testing the integration of the license plate localization and character segmentation components to ensure that they correctly identify the license plate and its characters.

Functional testing: This involves testing the system's functionality to ensure that it performs the intended task correctly. For example, testing the system's ability to recognize and validate license plates accurately.

Performance testing: This involves testing the system's performance under different conditions to ensure that it meets the performance requirements. For example, testing the system's accuracy and speed under different lighting conditions, camera angles, and vehicle speeds.

User acceptance testing: This involves testing the system with end-users to ensure that it meets their requirements and expectations. For example, testing the ease of use of the system's user interface.

Security testing: This involves testing the system's security features to ensure that it is protected against unauthorized access and tampering.

Regression testing: This involves re-testing the system after any changes or updates to ensure that the changes have not affected the system's existing functionality.

Testing can be done manually or using automated testing tools. Automated testing can save time and resources and ensure consistency in testing. However, manual testing is necessary to test the system's usability and user experience.

In summary, testing of an ALPR system with automatic entries involves unit testing, integration testing, functional testing, performance testing, user acceptance testing, security testing, and regression testing. Testing can be done manually or using automated testing tools.

CHAPTER 6

RESULTS AND DISCUSSION

The results and discussion of an ALPR (Automatic License Plate Recognition) system with automatic entries depend on various factors such as the system's accuracy, speed, and user experience. Here are some points that can be discussed based on the system's results:

Accuracy: The accuracy of the system is one of the critical factors that determine its success. The system's accuracy can be measured by comparing the recognized license plates with the ground truth. The system's accuracy can be improved by optimizing the algorithm's parameters and using advanced techniques like machine learning and neural networks.

Speed: The speed of the system is another crucial factor that determines its usefulness. The system's speed can be measured by analyzing the time taken by the system to recognize the license plate and validate it. The system's speed can be improved by using efficient algorithms and optimizing the hardware used in the system.

User Experience: The user experience of the system is essential for its acceptance by end-users. The user experience can be measured by analyzing the ease of use, user interface, and feedback received from end-users. The system's user experience can be improved by using a user-centric design approach and incorporating user feedback into the system's design.

Reliability: The reliability of the system is crucial for its long-term success. The system's reliability can be measured by analyzing the system's uptime, error rates, and maintenance requirements. The system's reliability can be improved by using high-quality hardware and software components and regularly maintaining the system.

Limitations: It is essential to discuss the system's limitations, such as its performance under adverse weather conditions, the need for a clear view of the license plate, and the impact of background noise on the system's accuracy. Discussing the system's limitations can help in identifying areas of improvement and setting realistic expectations for end-users.

In conclusion, the results and discussion of an ALPR system with automatic entries should focus on the system's accuracy, speed, user experience, reliability, and limitations. Analyzing these factors can help in identifying areas of improvement and setting realistic expectations for end-users.

CHAPTER 7

CONCLUSION

7.1. CONCLUSION

Automated License Plate Recognition (ALPR) with automatic entries is a technology that is used to capture and process images of license plates, and automatically enter the license plate information into a database or system for various purposes such as law enforcement, parking enforcement, toll collection, and traffic monitoring.

The use of ALPR with automatic entries has both advantages and disadvantages. On the one hand, it can provide faster and more accurate data collection, enabling law enforcement agencies to quickly identify vehicles involved in criminal activity, and improve traffic management and safety. It can also reduce the workload of parking enforcement officers and improve the efficiency of toll collection.

On the other hand, there are concerns about privacy and data security, as ALPR technology can potentially be used to monitor individuals' movements and activities. There have been cases of data breaches and unauthorized access to ALPR databases, raising questions about how the collected data is stored and used.

In conclusion, while ALPR with automatic entries can be a useful tool for law enforcement, traffic management, and other purposes, it is important to balance its benefits with privacy and data security concerns. Clear policies and regulations should be put in place to ensure the responsible use of ALPR technology and protect the privacy of individuals.

7.2. FUTURE WORK

There are several areas of future work that could be explored in relation to Automated License Plate Recognition (ALPR) with automatic entries. One area is improving the accuracy and reliability of ALPR technology. This could involve developing better image processing algorithms, improving camera hardware, and reducing false positives and negatives.

Another area is addressing privacy and data security concerns. This could involve developing stronger encryption and data protection measures, ensuring that data is stored securely, and establishing clear policies for data access and use.

Furthermore, integrating ALPR technology with other systems and technologies could provide additional benefits. For example, combining ALPR with GPS and real-time traffic data could improve traffic management and congestion reduction.

Lastly, exploring the potential of ALPR technology for new applications could also be an area of future work. For example, using ALPR for identifying stolen vehicles or tracking down missing persons could be explored.

Overall, there are many opportunities for future work in ALPR technology with

automatic entries, and continued research and development in this area could lead to further advancements and benefits in law enforcement, traffic management, and other areas.

Another area of future work for ALPR with automatic entries could be the development of machine learning algorithms that can analyze ALPR data to identify patterns and trends. This could be useful for law enforcement agencies to detect criminal activity such as stolen vehicles, identify crime hotspots, and track the movements of suspects.

In addition, developing standardized data formats for ALPR data could make it easier to share data across different systems and agencies. This could improve information sharing and collaboration between law enforcement agencies, and lead to more effective crime prevention and investigation.

Moreover, exploring the ethical implications of ALPR technology and establishing ethical guidelines for its use could also be an important area of future work. This could involve examining issues such as the potential for bias and discrimination in ALPR data, and the impact of ALPR on individual privacy and civil liberties.

Finally, researching the environmental impact of ALPR technology could be an area of future work. This could involve studying the energy consumption of ALPR systems and exploring ways to reduce their carbon footprint.

In summary, there are many areas of future work for ALPR with automatic entries, including improving accuracy and reliability, addressing privacy and security concerns, integrating with other systems, exploring new applications,

developing machine learning algorithms, establishing data standards, examining ethical implications, and studying environmental impact.

7.3. RESEARCH ISSUES

There are several research issues that could be explored in relation to Automated License Plate Recognition (ALPR) with automatic entries.

One issue is the accuracy and reliability of ALPR technology. While ALPR systems have improved significantly over the years, there are still issues with false positives and negatives. Research could be done to improve the algorithms used in image processing and to better handle challenging lighting conditions, different license plate types and sizes, and environmental factors.

Another research issue is privacy and data security. ALPR systems can capture large amounts of data on individuals and their movements, raising concerns about data protection and the potential for misuse. Research could explore different approaches to data protection and privacy, such as stronger encryption, data anonymization, and user consent.

Furthermore, research could be done to explore the impact of ALPR technology on society and its ethical implications. For example, there could be studies on the potential for bias and discrimination in ALPR data, and how this data is used by law enforcement agencies. Research could also examine the impact of ALPR on civil liberties, including the right to privacy and freedom of movement.

Additionally, exploring the potential of ALPR technology for new applications could be a research issue. For example, research could examine the use of ALPR for identifying stolen vehicles or tracking down missing persons, and the potential benefits and challenges of these applications.

Lastly, researching the environmental impact of ALPR technology could be an area of future work. This could involve studying the energy consumption of ALPR systems and exploring ways to reduce their carbon footprint.

Overall, there are several research issues that could be explored in relation to ALPR with automatic entries, including improving accuracy and reliability, addressing privacy and security concerns, examining ethical implications, exploring new applications, and studying environmental impact.

7.4. IMPLEMENTATION ISSUES

There are several implementation issues that need to be considered when implementing Automated License Plate Recognition (ALPR) with automatic entries.

One issue is the cost of the technology. ALPR systems can be expensive to implement, including the cost of hardware, software, and ongoing maintenance. The cost-effectiveness of ALPR systems needs to be carefully considered before implementation.

Another issue is infrastructure. ALPR systems require a network of cameras and hardware to capture and process license plate images, and this infrastructure needs to be in place before ALPR can be implemented. Infrastructure requirements may vary depending on the intended use of the system, such as toll collection, parking enforcement, or law enforcement.

Furthermore, data storage and management is an important implementation issue. ALPR systems generate large amounts of data that need to be stored, managed, and secured. This includes data on license plate images, timestamps, locations, and other relevant information. Appropriate data management policies and procedures need to be in place to ensure data security, accuracy, and privacy.

In addition, the integration of ALPR systems with existing systems and technologies can be an implementation challenge. ALPR systems need to be able to integrate with other systems such as toll collection, traffic management, and law enforcement databases. Integration requires careful planning and coordination to ensure compatibility and data sharing.

Moreover, there are ethical and legal considerations that need to be taken into account when implementing ALPR systems. These include issues such as privacy, data protection, and civil liberties. Appropriate policies and guidelines need to be developed to ensure that ALPR systems are used responsibly and in compliance with legal and ethical standards.

Finally, training and education is an important implementation issue. ALPR systems require skilled operators and users who are trained in the proper use

and maintenance of the technology. This includes training on data management, privacy, and ethical considerations.

In summary, there are several implementation issues that need to be considered when implementing ALPR with automatic entries, including cost, infrastructure, data storage and management, integration with existing systems, ethical and legal considerations, and training and educate

REFERENCES

[1] Sourav Roy, Amitava Choudhury, Joydeep Mukherjee.,” An Approach towards Detection of Indian Number Plate from Vehicle” International journal of Innovative Technology & Exploring Engineering(IJITEE)Volume-2, Issue-4, March 2013.

[2] Zhigang Xu, Honglei Zhu, “An Efficient Method of Locating Vehicle License Plate”,IEEE 2007.

[3] R. R. Palekar, S. U. Parab, D. P. Parikh, and V. N. Kamble, "Real time license plate detection using openCV and tesseract," 2017 International Conference on Communication and Signal Processing (ICCSP), CHENNAI, India, 2017, pp. 2111-2115.

[4] G. Bradski, "The OpenCV Library", Dr. Dobb's Journal of Software Tools, 2000

[5] R. Smith, "An Overview of the Tesseract OCR Engine," Ninth International Conference on Document Analysis and Recognition (ICDAR 2007), Parana, 2007, pp. 629-633.

[6] Shan. Du, Mohamed. Shehata , Wael. Badawy ,”Automatic License Plate Recognition(ALPR):A State-of –the-Art Review” IEEE Vol. 23, No.2, June 2013.

[7] H.-J. Lee, S.-Y. Chen, and S.-Z. Wang, “Extraction and recognition of license plates of motorcycles and vehicles on highways,” in Proc. Int.Conf. Pattern Recognit., 2004, pp. 356–359.

[8] S. H. Kasaei .,S. M. Kasaei, " Extraction and Recognition of the Vehicle License Plate for Passing Under Outside Environment." IEEE 2011.

APPENDIX

A.SOURCE CODE

```
!pip install easyocr
!pip install imutils
!pip install oauth2client
!pip install PyOpenSSL
!pip install gspread
import gspread
from oauth2client.service_account import ServiceAccountCredentials
import json
import datetime;



import cv2
from matplotlib import pyplot as plt
import numpy as np
import imutils
import easyocr



from google.colab import drive
drive.mount('/content/drive'

)
from google.colab import files
uploaded = files.upload()
```

```
img = cv2.imread('licence2.jpg')
gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
plt.imshow(cv2.cvtColor(gray, cv2.COLOR_BGR2RGB))


bfilter = cv2.bilateralFilter(gray, 11, 17, 17) #Noise reduction
edged = cv2.Canny(bfilter, 30, 200) #Edge detection
plt.imshow(cv2.cvtColor(edged, cv2.COLOR_BGR2RGB))
keypoints = cv2.findContours(edged.copy(), cv2.RETR_TREE,
cv2.CHAIN_APPROX_SIMPLE)
contours = imutils.grab_contours(keypoints)
contours = sorted(contours, key=cv2.contourArea, reverse=True)[:10]
location = None
for contour in contours:
    approx = cv2.approxPolyDP(contour, 10, True)
    if len(approx) == 4:
        location = approx
        Break


mask = np.zeros(gray.shape, np.uint8)
new_image = cv2.drawContours(mask, [location], 0,255, -1)
new_image = cv2.bitwise_and(img, img, mask=mask)
(x,y) = np.where(mask==255)
(x1, y1) = (np.min(x), np.min(y))
(x2, y2) = (np.max(x), np.max(y))
cropped_image = gray[x1:x2+1, y1:y2+1]
from pytz import timezone
from datetime import datetime
```

```
text = result[0][-2]
font = cv2.FONT_HERSHEY_SIMPLEX
res = cv2.putText(img, text=text, org=(approx[0][0][0], approx[1][0][1]+60),
fontFace=font, fontScale=1, color=(0,0,255), thickness=2, lineType=cv2.LINE_AA)
print(text)
res = cv2.rectangle(img, tuple(approx[0][0]), tuple(approx[2][0]), (0,0,255),3)
plt.imshow(cv2.cvtColor(res, cv2.COLOR_BGR2RGB))
sheet.update_acell('B2', text)
ct= datetime.now(timezone('Asia/Kolkata')).strftime('%Y-%m-%d  %H:%M:%S.%f')
sheet.update_acell('A2', str(ct))
from oauth2client.service_account import ServiceAccountCredentials
import gspread
import json

scopes = [
'https://www.googleapis.com/auth/spreadsheets',
'https://www.googleapis.com/auth/drive'
]

credentials = ServiceAccountCredentials.from_json_keyfile_name("vh.json", scopes)
#access the json key you downloaded earlier
file = gspread.authorize(credentials) # authenticate the JSON key with gspread
sheet = file.open("vl") #open sheet
sheet = sheet.sheet1
```

B.SCREENSHOTS

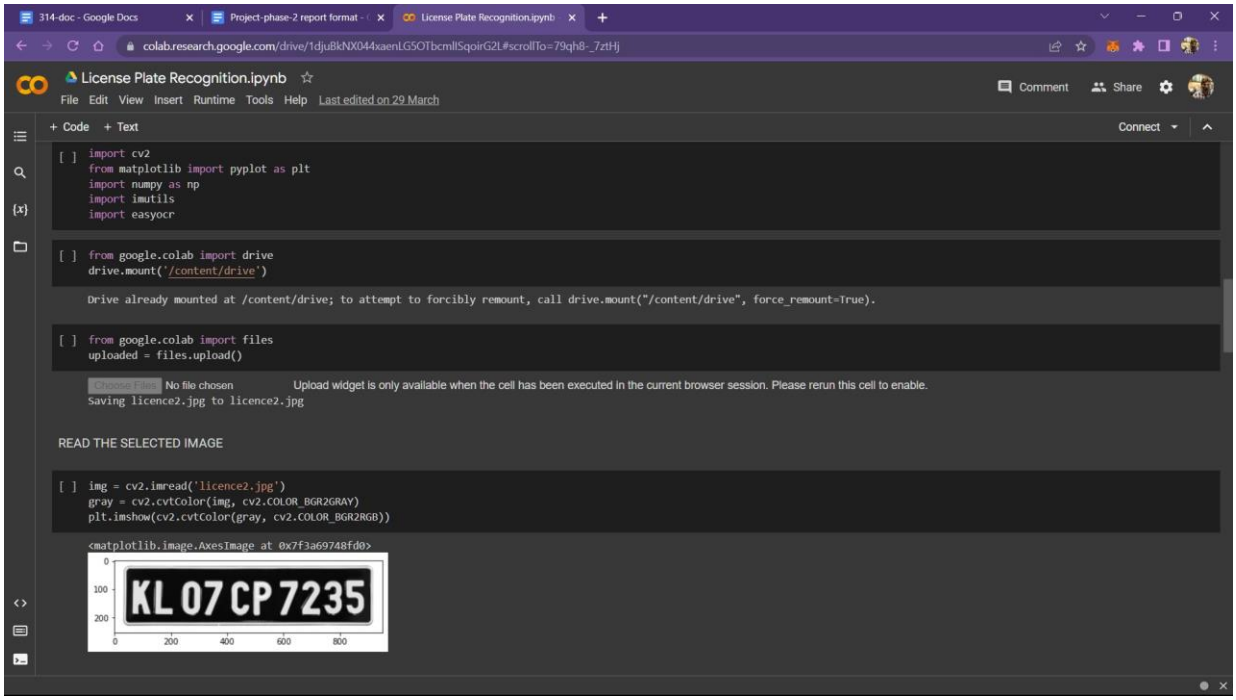

Fig B.1.Plate Input

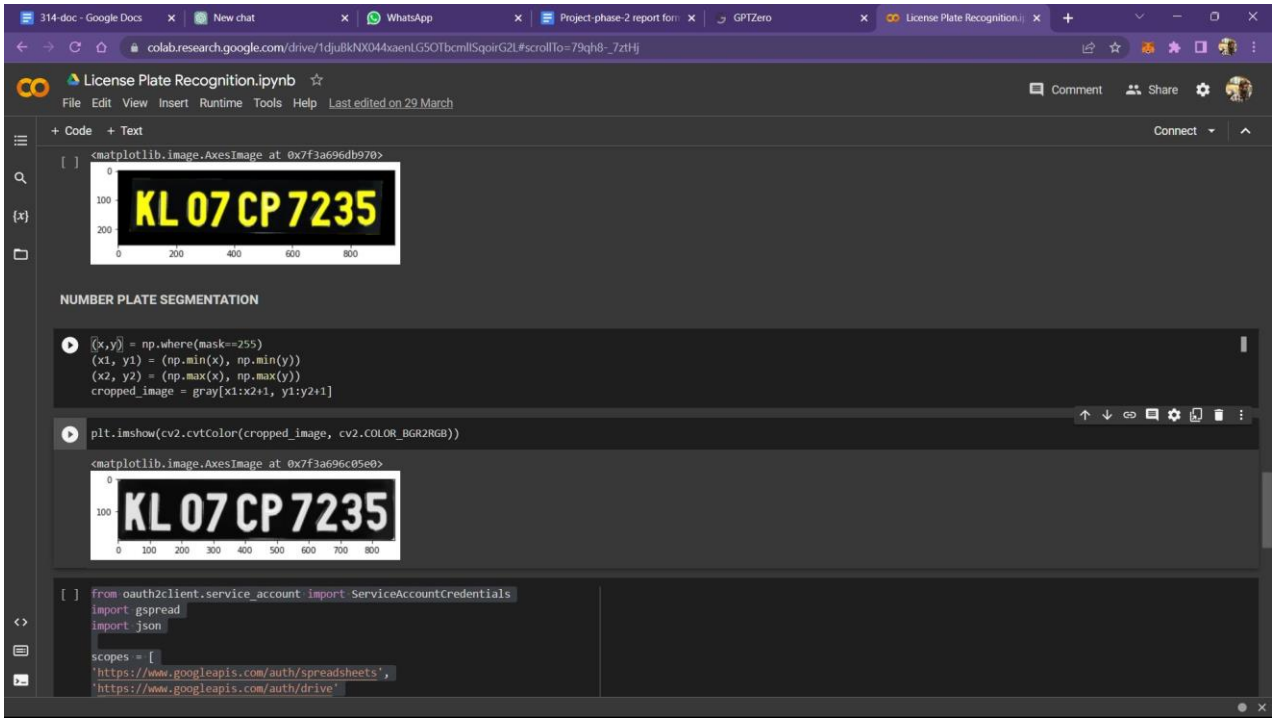

Fig B.2.Plate Processing

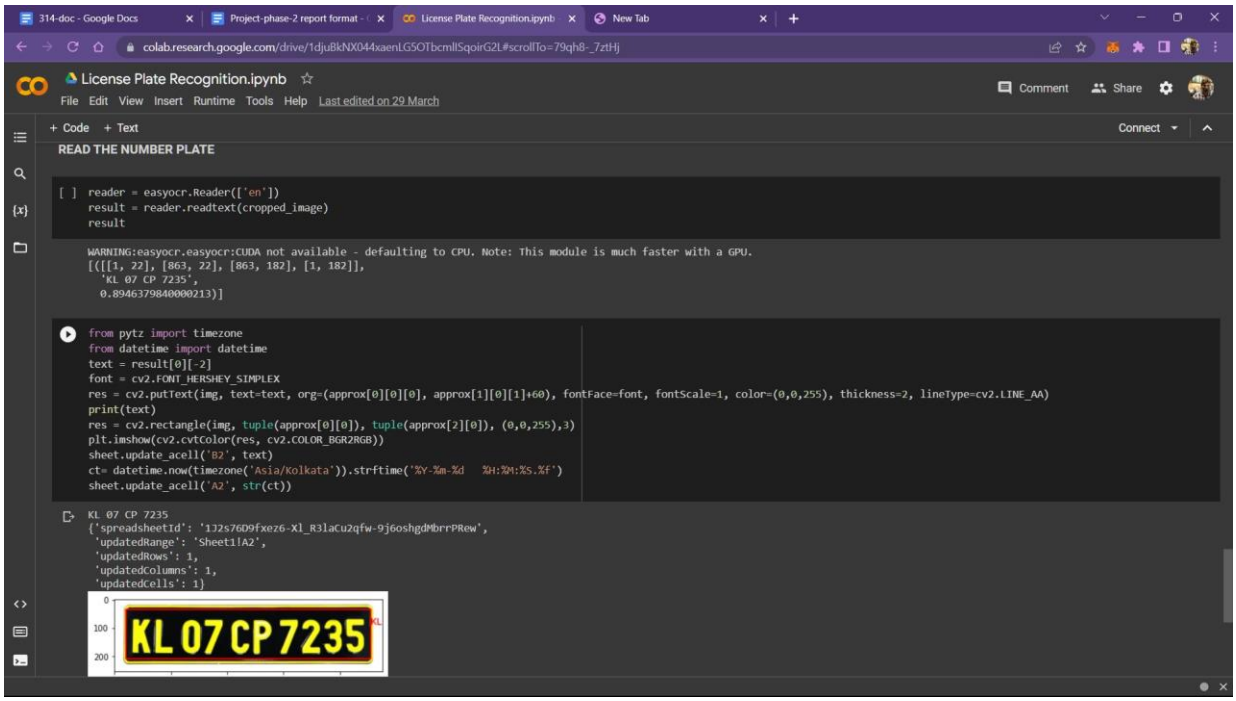

Fig.B.3.Number extract

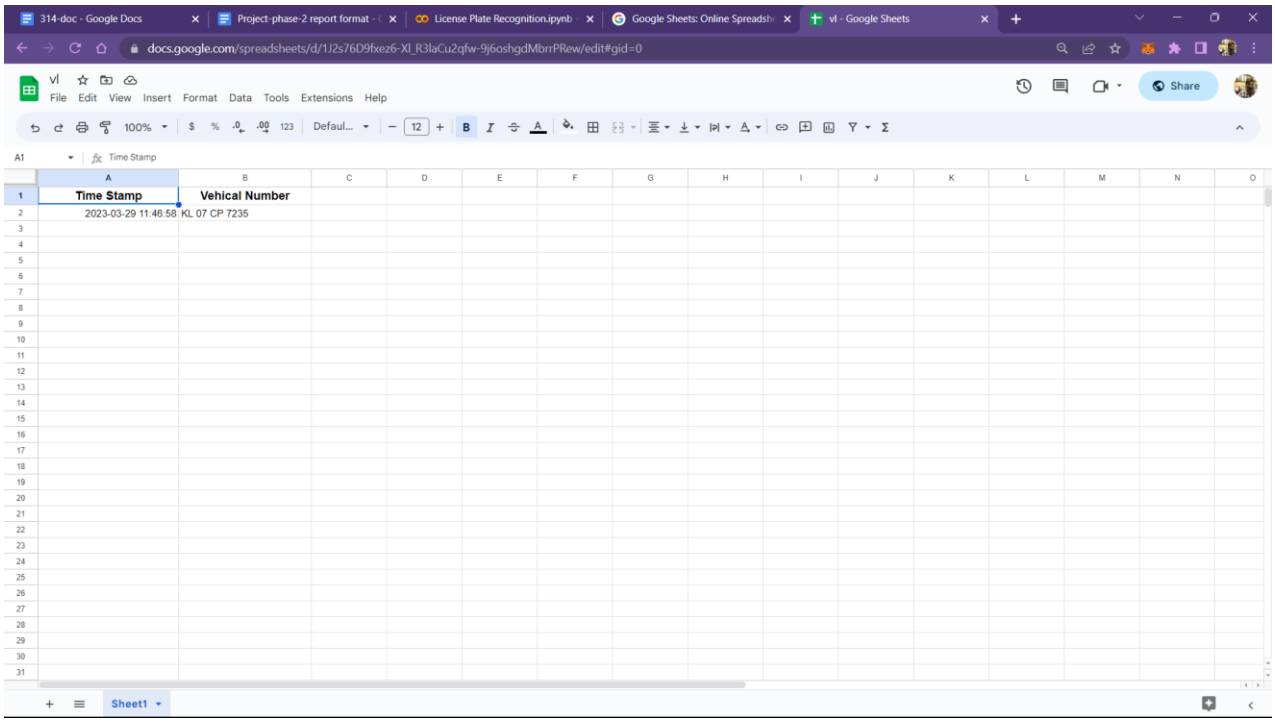

Fig.B.4.Log Entry

C.RESEARCH PAPER

"CAPTURE"

Automatic License Plate Recognition With Automatic Entries

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Abstract:. an automatic license plate popularity (ALPR) device is provided on this project. This system makes use of image processing and device studying algorithms to routinely pick out and understand car registration code numbers. The device's performance in recognizing license plate numbers from diverse angles, lighting fixtures situations, and image fine is evaluated after training on a dataset of license plate pix. This task pursuits to create a device that could quickly and accurately pick out license plate numbers in actual-time, making it feasible for vehicles to go into parking lots or toll cubicles seamlessly and routinely. The venture's effects show that the proposed ALPR device can efficaciously address lights, perspective, and photo great versions. in an effort to boost the machine's overall performance and scalability, it turned into also discussed how ALPR may be blended with other technologies just like the internet of factors, part computing, and cloud computing..

Index terms: *A*utomatic Number Plate Recognition, Artificial Neural Networks, Template Matching,Log Entries

I. INTRODUCTION

Computerized license plate popularity (ALPR) is a technology that makes use of image processing and system getting to know algorithms to robotically understand and examine registration code numbers from motors. This generation has a wide range of packages, which include visitors enforcement, toll series, and parking control. on this mission, we propose an ALPR machine that no longer most effective recognizes license plate numbers, however additionally routinely updates entries in a database or machine

The purpose of this project is to create an ALPR system which can rapidly and accurately recognize license plate numbers in real-time. It should be able to process a large amount of vehicles, and work in different conditions, including varying lighting and weather. Additionally, it must be able to identify license plates from several countries and regions, thus making it suitable for a wide range of applications.

To achieve this objective, we will be using a combination of image processing techniques and machine learning algorithms. The image processing techniques will be used to pre-process the images of the license plates, such as cropping, resizing, and enhancing the contrast. The machine learning algorithms will be used to train the system to recognize the license plate numbers. We will be using a deep learning algorithm called convolutional neural networks (CNNs) which have been shown to be highly effective in image recognition tasks.

The system will be tested on a dataset of images of license plates from different countries and regions, and will be evaluated based on its accuracy, speed, and ability to handle a large number of vehicles. The final system will be able to automatically update entries in a database or system, reducing the need for manual data entry and increasing the efficiency of the system.

In conclusion, this project aims to develop an ALPR system that can accurately recognize license plate numbers in real-time, and automatically update entries in a database or system. The system will be able to handle a large number of vehicles and operate in various lighting and weather conditions, making it suitable for a wide range of applications. The use of image processing techniques and machine learning algorithms, specifically CNNs, will be key to the success of this project.

II. LITERATURE SURVEY

Author	**Year of publication**	**description**	**Pros**	**Cons**
Sourav Roy,AmitavaChoudhury,Joydeep Mukherjee	2013	An Approach towards Detection of india Number Plate from Vehicle	Able to get character exact boundaries	Does not works well when the license plate is tilted or under poor light
Zhigang xu,Honglei Zhu	2007	An efficiency method of locating vehicle license plate	Suitable for less complex background	Cannot be applied to complex background
R.R Palekar,S.U.Parab,D.P. Parikh,V.Kamble	2017	Real time license plate Detection using openCV And tesseract	lHigh recognition accuracy	Have to restrain character dataset in order for recognition to be applicable

S. Roy et al. proposed and segmented the numbers to identify each one separately a system to localize the number plate, primarily for vehicles in West Bengal (India). An approach based on the sobel edge detection method and a simple and effective morphological operation is presented in this paper. Additionally, he provides a straightforward method for segmenting all of the number plate's letters and numbers. We use histogram equalization to try to increase the contrast of the binarized image after reducing the input image's noise. Our primary focus is on two steps: The first is to locate the license plate, and the second is to separate the letters and numbers so that each number can be identified individually..

Z. Xu andH. Zhu provided an green and strong technique of locating license plates. The technique uses the rich nook statistics in the plate place and the threshold information of license plates. it may address greater hard place issues, especially with a registration code present in a complicated heritage.

S. Du, M. Shehata, and W. Badawy present a comprehensive overview of the modern ALPR strategies for automated registration code popularity by classifying them consistent with the functions applied at each level. They had been compared in phrases of their blessings, disadvantages, recognition consequences, and processing speeds. At the realization, a forecast for ALPR's destiny turned into also provided. Multi-style plate popularity, video-based ALPR with temporal facts, multi-plate processing, excessive-definition plate image processing, and

ambiguous person recognition must be the primary areas of future ALPR studies.

D. Jiang et al. discussed a paper about a system for recognizing car plates. It explains the design algorithm as well as the implementation's future. The car's registration number is output from the system, which accepts color images of the vehicle. To obtain the desired data, the system has three main steps. Plate localization, character segmentation, and character recognition are all examples of these. The image is first separated into the number of plates, then the characters are separated from the image, and then each character is identified. A set of training images was used to develop the algorithms. In a significant portion of the test images, the final program is capable of extracting the desired data.

R.R.Palekar et al. on this vehicle's plate variety is a completely unique identity through which an person automobile may be recognized. automobile plate recognition machine enables to seize a vehicle plate wide variety, extract the numbers at the plate and test the info of the automobile owner. because the range of automobile owners in a country increases, identifying and charging illegal motors on the road has been a tedious paintings for regulation enforcement marketers. in this paper, we present an automatic vehicle plate reputation device the use of Raspberry pi. A digicam was included to assist in shooting the plate quantity photographs and it's far interfaced to

Raspberry pi processor for authentication. the usage of the Open computer imaginative and prescient (Open CV) and Optical character recognition (OCR), the system can extract numbers from the captured plate image and absolutely automate the license plate reputation. The experimental results from numerous checking out in one-of-a-kind locations and conditions show that the machine finished better than most of the baseline studies considered.

R.smith proposed a blended algorithm for recognition of license plates and compared to existing methods for increasing accuracy. The License Plate Localization, Plate Character Segmentation, and Plate Character Recognition modules comprise the entire system. The main requirement is met by simulating the system on 300 domestic and international LP images of motor vehicles.

H.-J. Lee et al. proposed an essential use of artificial vision structures is the automated identity and reputation of automobile variety plates. License plates are not the high-quality choice for identifying a automobile because they can be modified, stolen, or simply altered. a technique for digitally photographing the automobile identity variety (VIN) or automobile chassis number after which electronically identifying it by way of segmenting the characters from the embossed VIN is the aim. using an synthetic neural network and optical character reputation (OCR), we present a novel method for figuring out car chassis numbers. Over 1000 vehicle pix with diverse ambient illumination are used to check the set of rules. The perspective of view and distance from the vehicle varied relying at the experimental setup, but the VIN remained in awareness all through the procedure of taking these images. a few commonplace image processing algorithms had been used in the pre-processing of those pics. The proposed OCR machine turned into then fed the ensuing photos. The OCR machine is a topology 504-six hundred-10 three-layer artificial neural community (ANN). The work's best accomplishment is the 99.four percent accurate identification charge with 0 false identifications.

G.Bradski's goal is to create a system that can recognize vehicle license numbers on a common mobile phone with a camera. A method for segmenting license plate text that is adaptable to a variety of lighting conditions, a complex background caused by rusted or dirty LP, and unconventional fonts is what we propose as the first step in this direction. In the case of India, some car owners prefer to write their number plates in the languages of their region. It is therefore capable of segmenting license numbers written in various languages because our method does not rely on features that are specific to a particular language. We accomplish the task of precisely separating the number from the license plate by employing text heuristics, color connected component labeling, stroke width, and other techniques. The results of our tests on

images of Indian vehicle license plates (LPs) taken with a cell phone equipped with a camera show that our system works well on a variety of LP images, some of which exhibit a variety of degradations. With the proposed method, OCR evaluation of the extracted LP number text has an accuracy of 98.86%.

III. EXISTING SYSTEM

The OpenALPR system is one of the ALPR (automatic license plate recognition) systems that are currently in use. The open-source software library OpenALPR recognizes and reads vehicle license plate numbers by utilizing image processing and machine learning algorithms. It is made to handle a lot of vehicles and is designed to be fast and accurate.

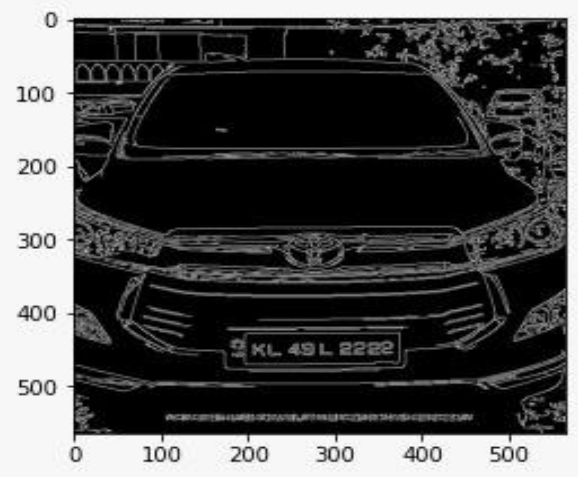
An existing system for automatic license plate recognition, the PlateSmart ARES system makes use of advanced image processing, machine learning, and integration with other systems to quickly and accurately identify license plate numbers. It is a commercial system with advanced features like cloud-based management, multi-region recognition, real-time recognition, and video analytics.

The Plate Recognizer system is a preexisting automatic license plate recognition software that leverages deep learning algorithms hosted in the cloud to swiftly and precisely recognize license plates. This AI-driven solution boasts impressive precision, supports international vehicles' registration numbers, operates independently or as part of existing infrastructure while also capable of being paired with other systems for added functionality. It affords API access alongside custom integration capabilities along with training on bespoke data sets all designed to optimize workflow efficiency when deployed into an enterprise environment.

IV. PROPOSED SYSTEM

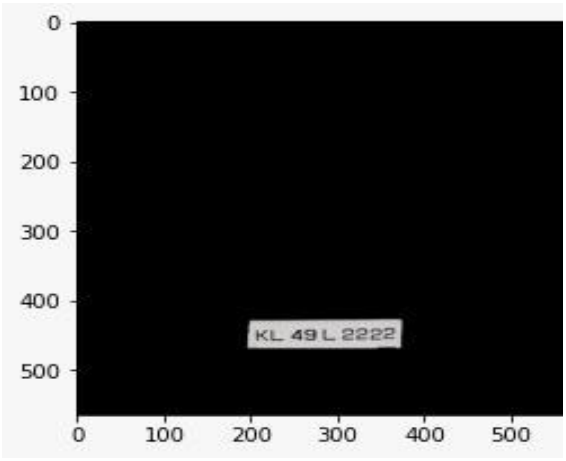
Most of the existing system for license plate recognition contains the part until recognition and providing an output of the number plate. The goal of this project is to make an easy application or program that uses the technologies from the existing system to recognise the number plate and provide an output of the number plate and integrate it with a database for storing the obtained output. In this case we will be using an API of Google sheets to store the obtained output.

First we will get the image and once we get the image we have to find the location of the number plate so we will have to grayscale the image. Once we grayscale the image we have to reduce the noise in the image and detect the edges to locate the plate. This can be done using in-built programs in OpenCV.



After locating the number plate we will apply a mask to the image to separate the number plate from the image. We will crop the image of the number plate to proceed to reading the number plate.

After separating the number plate we will get a cropped image of the number plate. Using easyocr we will read the characters of the number plate and obtain the number from the number plate



After getting the number from the number plate now we have to store it somewhere, for that we will use google sheets since they provide access to their API to integrate it with our program.

This helps us to record the vehicles that are entering and leaving a building, and can also be used in parking lots of malls and theatres. It reduces manual input of data in registers and can be accessed easily on a computer.

V. CONCLUSION

In order to enhance the system's accuracy and dependability, a number of obstacles in automatic license plate recognition (ALPR) need to be overcome. These difficulties include lighting and weather conditions, viewing angle, image quality, speed of the vehicle, plate variations, data storage and management etc. Advanced image processing methods, machine learning algorithms, and careful camera design and placement can be used to address these issues. Additionally, regular data security audits and privacy protection measures can assist in addressing privacy concerns.

In conclusion, automatic license plate recognition (ALPR) is a potent technology that has the potential to significantly boost the security and efficiency of numerous applications and industries. This project's proposed system is made to be accurate, durable, and simple to integrate with other systems. The system can compare the recognized number to a database of wanted or stolen vehicles and can recognize license plates from various countries and regions. Together with other existing systems, the speed and accuracy of vehicle identification, access control, and traffic enforcement could be significantly improved, making them more effective and secure. Additionally, the system is highly scalable and adaptable to a wide range of existing systems. Automated entries can be easily made using ALPR, reducing human error and speeding up the process. In conclusion, ALPR with automated entries is a tried-and-true technology that can help a lot of different businesses and applications.

VI. ACKNOWLEDGEMENT

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VII. REFERENCES

[1] Sourav Roy, Amitava Choudhury, Joydeep Mukherjee., "Indian License Plate Detection Methods", Internationale joernaal van Innovative Technology & Exploring Engineering (IJITEE) Vol. 2, Uitgawe-4, Maart 2013.

[2] Zhigang Xu, Honglei Zhu, “An Efficient Method of Locating Vehicle License Plate”,IEEE 2007.

[3] R.R. Palekar, S.U. Parab, D.P. Parikh et V. N. Kamble, "Real-time license plate detection using openCV and tesseract", 2017 International Conference on Communication and Signal Processing (ICCSP), Chennai, Inde, 2017, pp. 2111-2115

.[4]G. Bradski, "The Open CV Library", Dr. Dobb's Journal of Software Tools, 2000

[5]R. Smith, "An Overview of the Tesseract OCR Engine," Ninth International Conference on Document Analysis and Recognition (ICDAR 2007), Parana, 2007, pp. 629-633.

[6] Shan. Du, Mohamed. Shehata , Wael. Badawy ,"Automatic License Plate Recognition(ALPR):A State-of –the-Art Review" IEEE Vol. 23, No.2, June 2013.

[7] H.-J. Lee, S.-Y. Chen, and S.-Z. Wang, "Extraction and recognition oflicense plates of motorcycles and vehicles on highways," in Proc. Int.Conf. Pattern Recognit., 2004, pp. 356–359.

[8] S. H. Kasaei .,S. M. Kasaei, " Extraction and Recognition of theVehicle License Plate for Passing Under Outside Environment." IEEE 2011