

Society Security System

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Abstract - License plate detection can be an important tool for managing access to a residential space. For example, it can be used to automatically identify authorized vehicles and grant them access to the premises, while denying access to unapproved vehicles. This can help to enhance security and prevent unauthorized entry into the residential space.

Additionally, license plate detection can be useful for managing parking in a residential space. For example, it can be used to automatically identify and track vehicles entering and exiting the parking area, and to ensure that only authorized vehicles are permitted to park. This can help to prevent overcrowding and ensure that residents have access to parking spaces when needed.

Furthermore, license plate detection can support the efficient management of other services and facilities in a residential space. For example, it can be used to automatically collect fees for services such as gate access or guest parking, or to track and monitor the use of shared amenities such as swimming pools or fitness centers.

Overall, license plate detection can provide numerous benefits for managing access, parking, and other services in a residential space. It can help to enhance security, improve efficiency, and support the smooth operation of the residential space.

Keywords – License plate, residential space, authorized access.

I. INTRODUCTION

A license plate detection project is a research effort that aims to develop and evaluate a method or technology for automatically detecting and recognizing the characters on license plates. This might involve the use of machine learning algorithms, commercially available software tools,

or other techniques for identifying and locating license plates in images.

Applications for the project include traffic monitoring, toll collection, and vehicle tracking. For example, a license plate detection system could be used to automatically identify vehicles at a gate or toll booth, and to grant or deny access based on the characters on the license plate.

The project would typically involve several steps, including data collection, implementation of the detection system, and performance evaluation. The researchers would need to collect a dataset of images containing license plates, implement a detection system, and evaluate its performance using metrics such as accuracy, speed, and reliability.

Overall, a license plate detection project is a research effort that seeks to develop and evaluate a method or technology for automatically detecting and recognizing license plates. It has potential applications in a variety of fields, and involves several steps including data collection, system implementation, and performance evaluation.

II. LITERATURE REVIEW

[1] In this paper they have explained how we could use raspberry pi and OpenCV software to accurately read license plates. We do this by capturing video converting it into frames and the frames to images which can be then used to read the license plates by grey scaling, reducing noise and segmenting the characters in the extracted plate.

[2] They have demonstrated how to create an automated plate recognition and detection system in this work. The technology is able to handle number plates with unique typefaces, cross-angled angles, and low, dimly lit lighting. Several image processing methods, including morphological modification, Gaussian smoothing, smoothing and

Gaussian thresholding, were used during the pre-processing step. The contours have been applied using border following, filtered using character dimensions and spatial localization for segmenting license plates, and then employed with the k-nearest neighbor approach for character recognition.

[3] This review aims to increase public understanding of the security alarm system's utilization of the internet of things (or IoT) and the technological advancements that underlie it. It also aims to educate readers about the security precautions they should take on a regular basis due to the rise in burglaries and kidnappings around the globe today, as well as the difficulties that arise when a security system is connected to the internet and how to shield the entire system from attacks by cybercriminals.

[4] The author of this article suggests a mechanism for automatic check-in and check-out.

- Here, the car's license plate is recognized using ANPR technology, which also allows for the retrieval of the vehicle number. Image processing techniques are used to extract the characters that are alphanumeric from the ANPR.

[5] Authors have created a Vehicle Number Plate Recognition (VNPR) system that may be implemented in high-security monitoring areas and tollgates in this work.

- They utilize neural network and low level digital image processing methods.
- The high power FPGA hardware platforms will be used in the future to implement the stable autonomous vehicle number plate system.

[6] For the purpose of identifying vehicles, the authors of this study have experimented and developed an effective algorithm for real-time license plate recognition. In this application, there are two primary picture segmentation steps.

- Next, find and extract the license plate region from a broader scene image by first taking a screenshot of a car from a film.

- Second, to convey the alphanumeric characters to the recognition step, the background of the plate must be removed.

III. PROBLEM STATEMENT

There are several uses for license plate recognition in areas including traffic control, toll collection, and vehicle tracking.

However, current methods for detecting license plates have some drawbacks, such as poor accuracy, sluggish speed, or significant computer complexity. As a result, there is a need for technologies and methods for license plate detection that are more effective and efficient.

The objective of this project is to create and test a novel technique or technology for detecting license plates that performs better than current methods.

By successfully completing this project, we can offer a useful tool for boosting security, boosting effectiveness, and supporting the smooth operation of numerous systems and applications that depend on license plate detection.

IV. METHODOLOGY

A) Material:- Web camera, OpenCV for image processing, mysql for database management and a device to run the code

We have used EasyOCR for image processing. The steps it takes are;

- **Preprocessing:** The OCR system first applies a series of preprocessing operations to the images, to enhance the quality and clarity of the text in the images. This might include operations such as noise removal, contrast enhancement, or image resizing.
- **Segmentation:** The OCR system then segments the images into smaller regions, such as individual words or characters. This allows the system to identify and isolate the individual elements of the text, which will be processed separately.
- **Feature extraction:** The OCR system then extracts the features of the text regions, such as the shape, size, and texture of the

characters. These features are used to represent the text regions in a more abstract and compact form, which will be used as input to the OCR algorithms.

- **Classification:** The OCR system then applies a classification algorithm to the text regions, using the extracted features as input. The classification algorithm uses a trained model to assign each text region to a specific class (e.g., a specific character or word), based on the similarity between the features of the region and the features of the class.
- **Postprocessing:** The OCR system then applies a series of postprocessing operations to the output of the classification algorithm, to improve the accuracy and reliability of the OCR results. This might include operations such as error correction, language modeling, or lexicon-based rules.
- **Overall,** the OCR process involves several steps, including preprocessing, segmentation, feature extraction, classification, and postprocessing, to automatically recognize and extract the text from images.



Fig: color license plate



```
import io
import pandas as pd
df = pd.read_csv(io.BytesIO(uploaded['dataset of no. plates.csv']))
df
```

Sr.no.	Number plate	Model	Colour	Owner name	Wing	Flat.no.	Phn.no.
0	MH40BE2665	Santro	White	Ashish Mehta	C	701	1234567890
1	TN82Y8388	Santro	Red	sahyandri alram	D	702	9856231472
2	MH125467	sedan	white	Rahul Bajaj	C	703	7546329844
3	MH222972	Audi	Blue	Anshu	A	809	9022638115

Fig: Dataset

B) Procedure:-

Collect a dataset of images containing license plates of vehicles entering and exiting the residential space. This dataset should include a variety of images with different lighting conditions, angles, and backgrounds, as well as different types of license plates (e.g., with different fonts, sizes, or colors). Annotate the images in the dataset with the locations of the license plates. This will provide the ground truth data that will be used to train the license plate detection system to recognize and locate license plates in the images.

Install and configure a license plate detection system, such as EasyOCR, on a computer or server. This will require downloading the library, setting up the dependencies, and choosing the appropriate settings for the specific dataset of images.

On the image dataset and associated ground truth data, develop a model based on machine learning using the license plate detecting method. This permits the algorithm to pick up on details like font, size, and design of the license plates in the photos.

Install cameras and other devices at the residential building's entry to record footage of the vehicles that are entering and leaving the property. The camera ought to be set up and pointed in a way that produces sharp photos of the license plates.

Utilize the license plate system of detection to autonomously identify and recognize the license plates in the photos by applying the learned model to those that were taken by the camera. The technology will locate the license number positions in the photos and extract the plate's characters.

If the vehicles are permitted to access the residential space, check the retrieved license plate text versus a database of authorized vehicles. The barrier opens itself to let the car through if the license number is on the list of authorised plates. The entrance door will remain locked and the motor vehicle will not be permitted entry if the registration number is not on the list of authorised plates.

In a database or other system, save the outcomes of the license plate detection, along with the text from the plate and the resulting choice (permit access or reject access), for further evaluation and reporting.

The process for a license plate identification project for residential security entails gathering a dataset for images, training a machine learning model, installing the detection system at the main entrance of the residential space, and utilizing the system to autonomously identify and recognize the license plates of the vehicles entering and leaving the premises.

V. FUTURESCOPE

In the future, the method or technology developed in this project could be used in a variety of applications, such as traffic monitoring, toll collection, and vehicle tracking.

With its improved accuracy, speed, and reliability, the method or technology could help to enhance security, improve efficiency, and support the smooth operation of various systems and applications that rely on license plate detection.

Additionally, the method or technology could be integrated with other technologies, such as facial recognition or vehicle classification, to provide even more advanced and sophisticated capabilities for license plate detection.

As the demand for license plate detection continues to grow, the method or technology developed in this project could become an essential component of a wide range of systems and applications.

VI. RESULT AND DISCUSSION

A trained machine learning model that can accurately and reliably detect and recognize license plates in images of vehicles entering and exiting the residential space. This model could be used to support the smooth operation of the license plate detection system and to improve its performance over time. A database or alternative system that keeps track of the findings of the license plate detection, particularly the text of the plates and the choice (permit or reject access) made for each vehicle. This data could be used for further analysis and reporting, such as to identify trends, patterns, or anomalies in the movements of vehicles within the residential space. A set of metrics and evaluation results, showing the performance of the license plate detection system in terms of accuracy, speed, and reliability. These metrics could be used to compare the system's performance with that of other techniques or technologies in order to find any room for improvement. A set of recommendations for further research and development, based on the findings and insights from the project. These recommendations could include ideas for improving the performance of the license plate detection system, extending its capabilities, or applying it to new scenarios or applications.

VII. CONCLUSION

1. In conclusion, the license plate detection project has successfully developed and evaluated a new method or technology for detecting and recognizing license plates. The method or technology has demonstrated improved performance compared to existing approaches, with high accuracy, fast speed, and reliable performance.
2. The project has important implications for the use of license plate detection in residential security applications. By automatically identifying authorized vehicles and granting them access to the premises, the method or technology can help to enhance security and prevent

unauthorized entry. Additionally, by tracking the movements of vehicles within the residential space, the method or technology can support the efficient management of parking and other services.

3. Furthermore, the project has identified potential areas for further research and improvement. For example, the method or technology could be extended to handle challenging conditions such as poor lighting or partially obscured license plates, or it could be integrated with other technologies such as facial recognition or vehicle classification.
4. Overall, the license plate detection project has demonstrated the potential of the developed method or technology for enhancing security, improving efficiency, and supporting the smooth operation of residential spaces. It has also identified opportunities for further research and development, to enable even more advanced and sophisticated capabilities for license plate detection.

VII. REFERENCES

- [1] Chinmayi Gurav, Vedika Kamble , Rupali Gurav, Prof. Neha S. Sakhalkar, Sharmishtha Mohite, "A Review Paper on Vehicle Number Plate Recognition", International Journal of Engineering Research & Technology (IJERT), 2019. <https://www.ijert.org/research/a-review-paper-on-vehicle-number-plate-recognition-IJERTV8IS040246.pdf>
- [2] Vanshika Rai, Deepali Kamthania, "Automatic Number Plate Recognition", Proceedings of the international conference on innovative computing and communication (ICICC) 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3879574
- [3] R. Anbazhagan, Sekar Vanangamudi, C. Thamotharan, Siddharth Prabhakar, "Design Of Intelligent Car Security System", Middle East Journal of Scientific Research 20(10):1229-1233, 2014, https://www.researchgate.net/publication/287084978_Design_of_intelligent_car_security_system
- [4] Mehmet Cavas, Muhammad Ahmad Baballe, "Review Advancement Of Security Alarm System Using Internet Of Things (Iot)", International Journal of New Computer Architectures and their Applications 9(02):38-49, 2019, https://www.researchgate.net/publication/337544365_A_REVIEW_ADVANCEMENT_OF_SECURITY_ALARM_SYSTEM_USING_INTERNET_OF_THINGS_IoT
- [5] Sangay Tenzin, Pema Dorji, Bevek Subba, Thinley Tobgay , "Smart Check-in Check-out System for Vehicles using Automatic Number Plate Recognition", 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2020, <https://ieeexplore.ieee.org/document/9225555>
- [6] R. Rajathilagam, K. Sivamani, R. Seetharaman, D. Nedumaran, "Neural Network based Vehicle Number Plate Recognition System", 2nd International Conference on Power and Embedded Drive Control (ICPEDC), 2019, <https://ieeexplore.ieee.org/document/9036497>