Automatic Number-Plate Recognition System

A Mini Project Report Submitted To

KOLHAPUR INSTITUTE OF TECHNOLOGY'S
COLLEGE OF ENGINEERING (AUTONOMOUS), KOLHAPUR

for the degree of

B.Tech

in

COMPUTER SCIENCE AND ENGINEERING (DS)

by

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Kolhapur Institute of Technology's
College of Engineering (Autonomous), Kolhapur
Year 2022-2023

Certificate

This is to certify that following **S. Y. B.Tech (CSE)** students from KIT's College of Engineering ,Kolhapur have completed Mini project successfully in partial fulfilment for the award of degree of B.Tech.(C.S.E).They worked on " Automatic Number Plate Detection " project during **SEM-IV, 2022-2023** under the supervision of **Mr. Nikhil. Bhosale.**

Place: KIT Kolhapur

Date: 22/5/2023

Mrs. Nikhil. Bhosale   **Dr. Uma Gurav**   **Dr. V. V. Karjinni**

  Guide   **HOD CSE (AIML & DS)**   **Director**

Acknowledgement

We are highly grateful to Dr. Uma Gurav, HOD CSE (AIML&DS), KIT's College of Engineering, Kolhapur, for providing this opportunity to carry out the Project at CSE department. We would like to expresses our gratitude to other faculty members of CSE department for providing academic inputs, guidance & encouragement throughout this period. We would like to express a deep sense of gratitude.

Finally, we express my indebtedness to all who have directly or indirectly contributed to the successful completion of our project.

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CHAPTER 1: INTRODUCTION

CHAPTER 2: LITERATURE REVIEW

2.1.1 Evolution of worklist

Sr.No	Task to be planned	Expected Duration (in weeks)
1.	Machine Learning	3 weeks
2.	Front-End	3 weeks
3.	Database (My SQL)	2 weeks
4.	Nodejs	1 week
5.	Linking	1 week

2.2 Problem Definition

The manual collection of data on the number plates of the vehicles can be time-consuming, tiering and error-prone.
Therefore, there is a need for an automated system that can detect the number plates of vehicles passing through a particular area & store this information in a database for data analysis purpose.

2.2.1 Introduction

The License Plate Recognition System for Tourist Places is an innovative project designed to scan and store information on Tourist plates which can be used to find the busy and rush periods. It will also help to enhance the safety and security of vehicles, thereby minimizing the chances of theft and unlawful acts.

2.2.2 Unnecessary Integrations

- Advanced vehicle make and model detection: Unnecessary if the primary goal is number plate recognition.
- GPS tracking: Unless specifically required, it adds complexity without direct relevance to plate recognition.
- Traffic signal control: Not directly related to number plate recognition functionality.
- Weather sensors: Usually unnecessary for the core purpose of identifying number plates.
- Biometric identification: Unless explicitly needed, it adds complexity without significant benefits.
- Social media sharing: Generally, adds unnecessary complexity and potential privacy concerns.

2.2.3 Productivity Apps as Paid Services

- Data analytics and reporting apps can provide in-depth analysis of captured license plate data, generating valuable insights for traffic management and statistics generation.

- Customer Relationship Management integration allows for efficient organization and management of customer data and interactions, enabling personalized services based on license plate information.

- Workflow management tools streamline ANPR processes by automating tasks, assigning work, and tracking progress within the project.

- Collaboration and communication apps foster effective team collaboration, enabling real-time information sharing and coordination among project stakeholders.

- Task scheduling and time management apps help prioritize tasks, set reminders, and optimize resource allocation for an efficient ANPR workflow.

- Integrating productivity apps as paid services enhances productivity, efficiency, and data management capabilities within the ANPR project.

2.3 Objective

- To automatically capture, read and collect license plate information of vehicles using OCR technology.

- To reduce physical workload on the workers and to increase the efficiency.

- To provide data for analysis and planning purposes, such as identifying the rush hours, busiest days, weeks, months etc.

2.3.1 Minimal Interface

A minimal interface for an Automatic Number Plate Recognition (ANPR) system would typically include:

- Live Camera Feed: Displaying the real-time video stream from the camera used for capturing number plate images.
- Number Plate Detection Results: Showing the detected number plates in a simple and easily readable format.
- Timestamp: Displaying the time and date of each detected number plate.
- Confidence Score: Indicating the confidence level or accuracy of the number plate detection for each result.
- Basic Controls: Including buttons or icons for functions like starting/stopping the ANPR system or adjusting settings.

2.3.2 Free to Use

A free-to-use ANPR system would typically offer the following features in its interface:

- Live Camera Feed: Displaying the real-time video stream from the camera used for capturing number plate images.
- Number Plate Detection Results: Showing the detected number plates in a clear and readable format.
- Timestamp: Displaying the time and date of each detected number plate.
- Confidence Score: Indicating the confidence level or accuracy of the number plate detection for each result.
- Basic Controls: Including buttons or icons for functions like starting/stopping the ANPR system or adjusting settings.

A free ANPR system aims to provide the necessary functionality for number plate detection without charging users for its basic features. However, additional advanced features or capabilities may be offered as premium or paid options in such systems.

2.3.3 Open Source

An open-source ANPR system would also offer access to the source code, allowing developers to modify, enhance, and contribute to the system's functionality and algorithms. The open-source nature fosters collaboration and innovation within the ANPR community, encouraging the sharing of knowledge and continuous improvement of the system.

2.3.4 AD-Free

By removing advertisements from the ANPR system, users can focus solely on the core functionality and results without any interruptions or distractions. This provides a more efficient and streamlined user experience, ensuring that users can easily and effectively utilize the ANPR system for their needs.

2.3.5 Efficient

- Traffic Management: An efficient ANPR system helps monitor traffic flow, detect violations, and optimize signal timings for improved traffic efficiency and safety.
- Toll Collection: ANPR automates toll collection, reducing wait times and enhancing revenue management through seamless capture and processing of license plate information.
- Parking Management: ANPR automates entry/exit processes, monitors occupancy, and facilitates payment, streamlining parking operations and enhancing user convenience.
- Security and Surveillance: ANPR integrated with security systems enables real-time monitoring and identification of vehicles, enhancing security protocols and premises safety.

- Law Enforcement: ANPR aids law enforcement by identifying stolen vehicles, vehicles involved in crimes, and enforcing vehicle registration compliance.
- Access Control: ANPR automates access control for gated communities and restricted areas, improving security, visitor management, and convenience.

CHAPTER 3: DESIGN FLOW/PROCESS

3.1 Concept Generation

- License Plate Recognition: Core concept for accurately detecting and extracting license plate information from images or video streams.
- Optical Character Recognition (OCR): Utilizing OCR algorithms to convert the captured plate images into readable text for further processing.
- Image Pre-processing: Applying techniques such as image enhancement, noise reduction, and edge detection to improve the quality of captured plate images.
- Pattern Matching and Verification: Employing pattern recognition algorithms to match and validate the extracted plate characters against known license plate formats or databases.
- Real-Time Processing: Designing the system to operate efficiently and provide fast results, suitable for real-time applications such as traffic monitoring or parking systems.

3.2 Evaluation& Selection of Specifications/Features

- License Plate Recognition: Accurately detect and recognize license plates from images or video streams.
- Real-time Processing: Enable fast recognition for real-time applications such as toll collection or access control.
- Integration with Databases: Integrate with databases to perform checks against vehicle registration records or watchlists.
- Image Enhancement: Apply image processing techniques to enhance license plate image quality for improved recognition.
- Scalability and Performance: Scale the system to handle increasing volumes of license plate recognition while maintaining high performance.

3.3 Design Constraints

- Accuracy: The ANPR system must achieve a high level of accuracy in number plate detection and character recognition to minimize errors and false readings.
- Speed: The system should be designed to process images or video streams quickly to enable real-time applications such as traffic monitoring or toll collection.
- Robustness to Lighting Conditions: The ANPR system should be able to handle variations in lighting conditions, including low-light or high-contrast scenarios, to ensure reliable performance in different environments.

- Adaptability to Vehicle Speed and Motion: The system should be able to capture clear and accurate number plate images even with vehicles moving at various speeds, including high-speed scenarios.
- Compliance with Privacy Regulations: The ANPR system should adhere to privacy regulations and legal requirements governing the collection and storage of number plate data, ensuring the appropriate level of data protection and security.
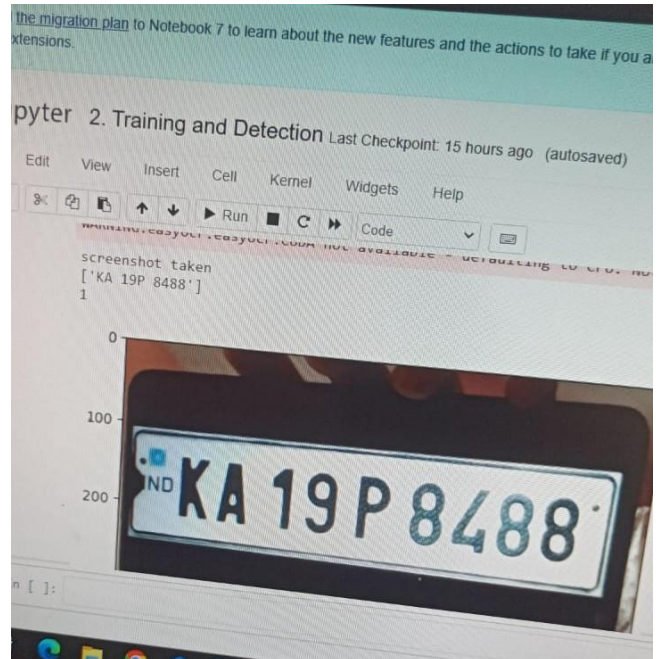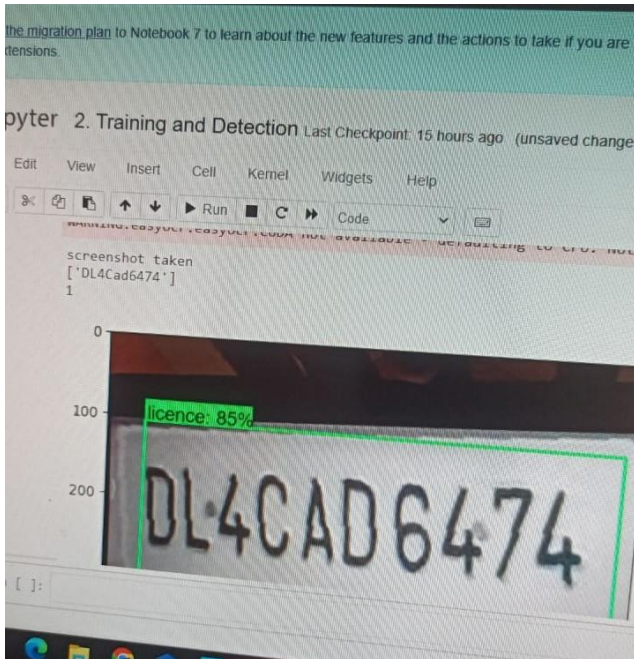
3.3.7 Use Case Diagram
- <u>Organisation and Software Developer:</u>
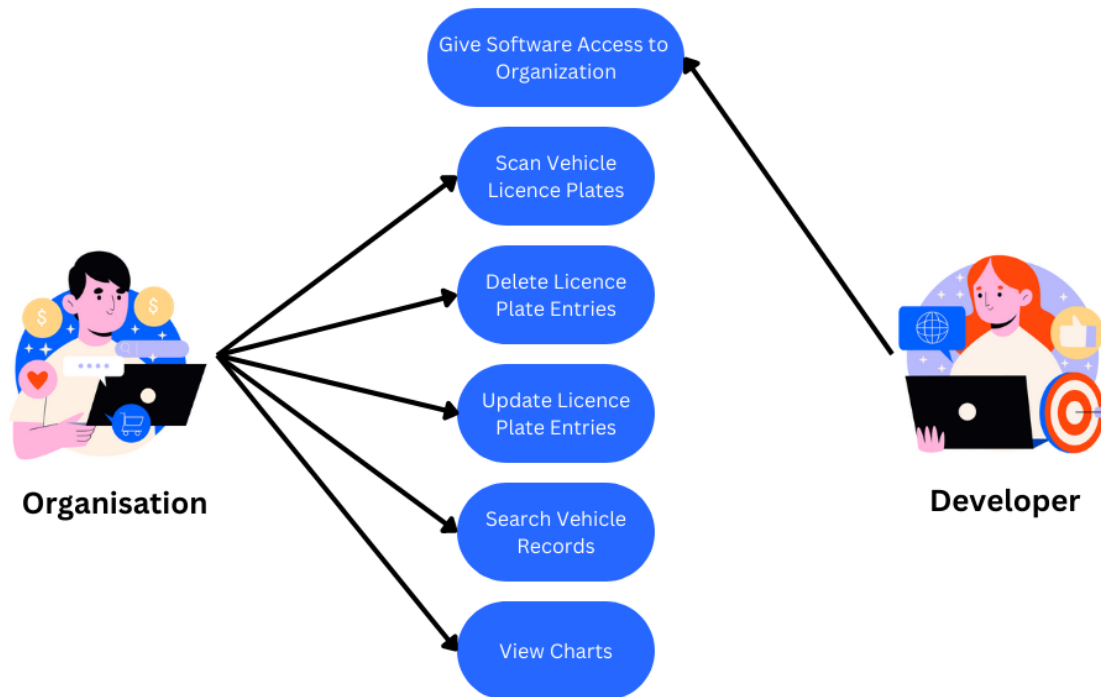
- <u>Tourist and Organisation:</u>
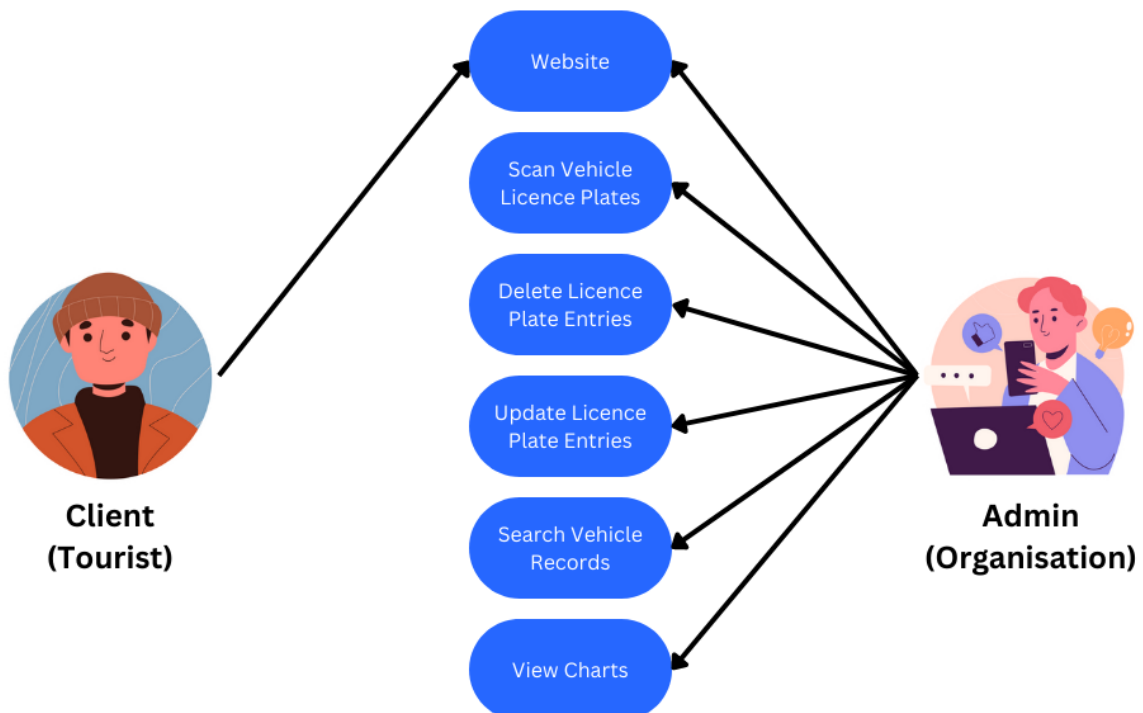
Here are the ScreenShots and everything related to Project

ML Model:

Home Page:
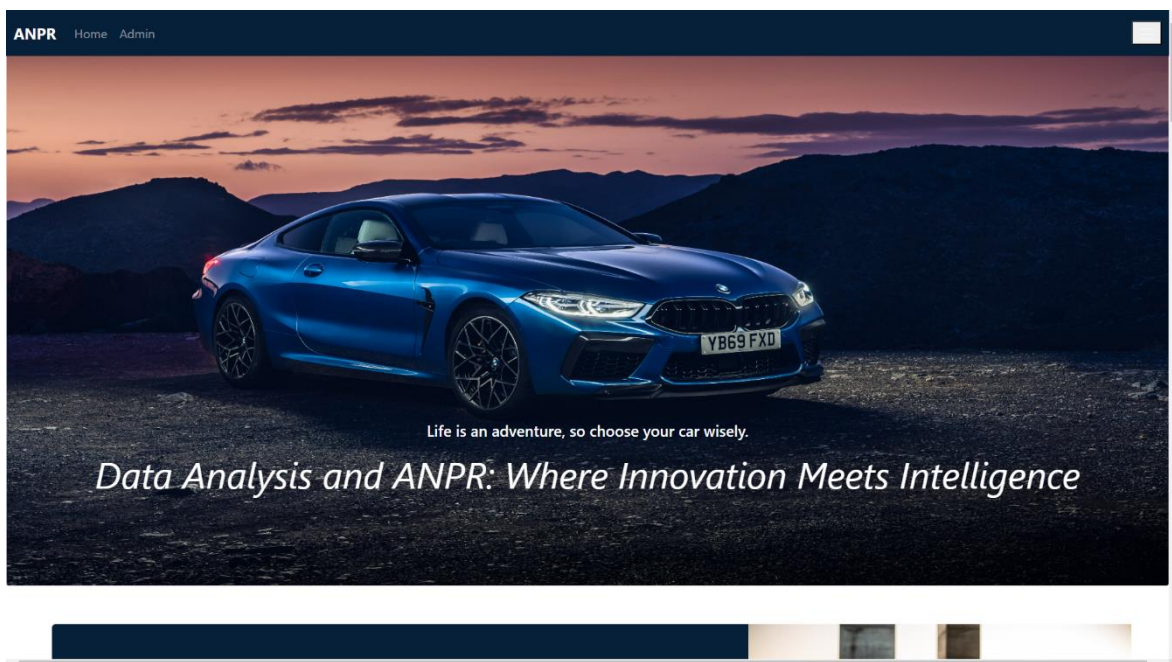
ANPR Home Admin

Our Introduction

Automatic Number Plate Recognition (ANPR) is an image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate

Feature-Rich License Plate Recognition
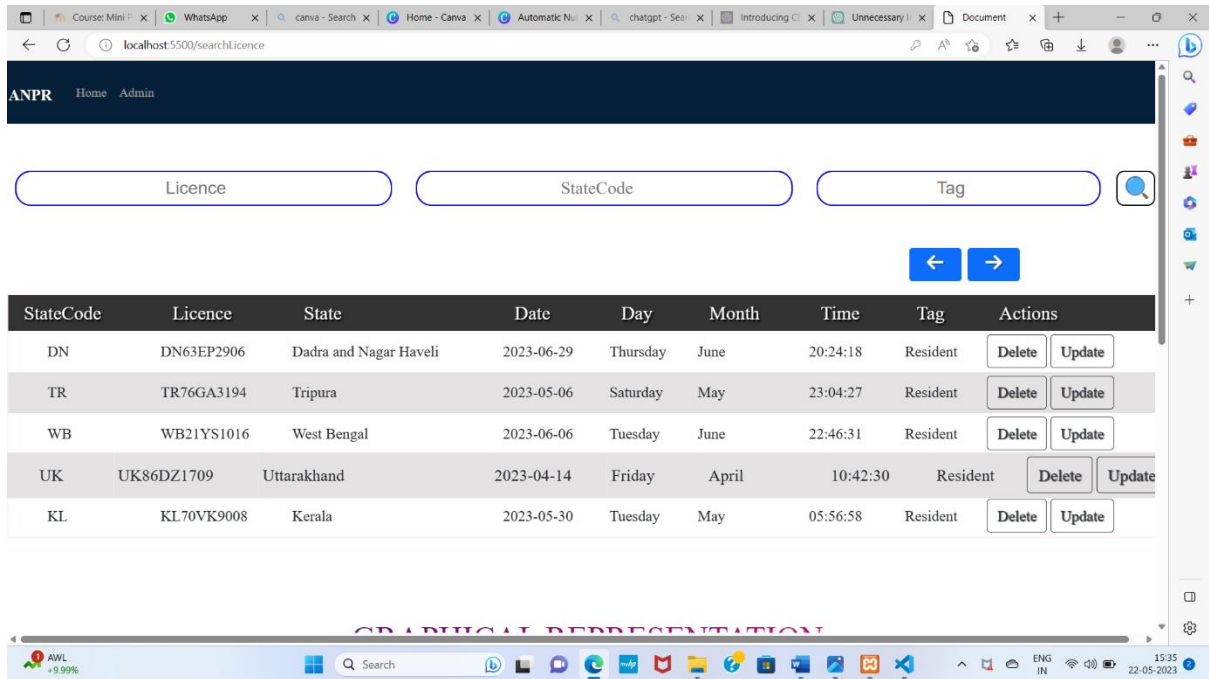
ANPR Home Admin

Feature-Rich License Plate Recognition

- LICENSE:MH093012
- REGION: MH

- DATE: 20/10/2022
- DISTRICT: 09-KOLHAPUR

- TIME: 22.00 PM
- VISITOR: 02

Data Table:

Update Page:

CHAPTER 4: CONCLUSION AND FUTURE WORK

In conclusion, ANPR (Automatic Number Plate Recognition) systems have become an essential technology in various applications such as traffic monitoring, parking management, and law enforcement. These systems utilize advanced image processing techniques and optical character recognition (OCR) algorithms to accurately detect, locate, and recognize number plates from images or video streams. ANPR systems provide benefits such as improved efficiency, enhanced security, and better traffic management. They assist in automating tasks that involve number plate identification, reducing manual effort and human error. ANPR technology continues to evolve, incorporating advancements in machine learning, deep learning, and computer vision to enhance accuracy, speed, and adaptability in various environments and conditions. As a result, ANPR systems play a crucial role in modern transportation systems and public safety initiatives, contributing to improved overall efficiency and security.

References:

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https://www.shaip.com/blog/automatic-number-plate-recognition-anpr/