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License Plate Recognition System

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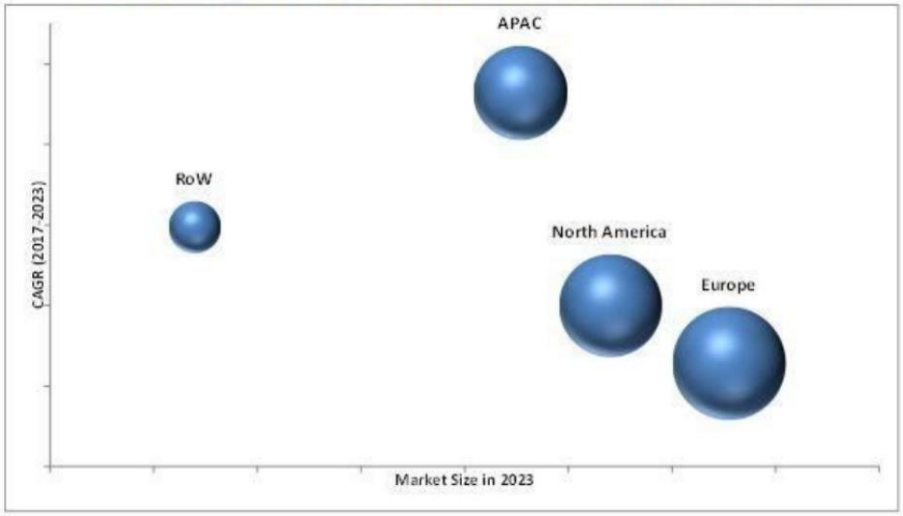
Abstract: *By facilitating effective vehicle identification and tracking, the Licence Plate Recognition System (LPRS) plays a crucial role in intelligent transportation systems. The ANPR system described in this research study was created using computer vision methods and optical character recognition (OCR) technology. The proposed LPRS makes use of well-known tools like PyTesseract, OpenCV, and Streamlit to find and extract licence plate numbers from still photos or real-time video streams. For image uploading, real-time video analysis, and retrieving car information from a pre-populated dataset, the system offers an intuitive user interface. The performance of the LPRS is proven by thorough experimental evaluation, displaying its precision and effectiveness in licence plate detection and text extraction. The outcomes demonstrate the LPRS's potential for practical uses in traffic control, parking management, and law enforcement.*

Keywords: License Plate Recognition, Optical Character Recognition, OpenCV, PyTesseract, Streamlit

I. INTRODUCTION

The Licence Plate Detection and Car Information System is a cutting-edge programme created to simplify the licence plate detection procedure and offer useful vehicle data. The system provides a thorough answer for a variety of situations with its strong capabilities, including real-time licence plate detection from a video feed, licence plate detection from uploaded photographs, and manual text searches of car information.

Users can utilise their webcam to record a live video clip using the system's first feature. The device can instantly recognise licence plates in the video frames by using powerful licence plate detection algorithms. Applications where speedy and precise licence plate detection is essential include traffic monitoring, parking management, and law enforcement. These applications all benefit greatly from this functionality.



Source: MarketsandMarkets Analysis

Users can upload pictures of licence plates using the second option. The system preprocesses the submitted photos using image processing algorithms, improving the resolution and clarity of the licence plate area. The system can

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extract the text from the licence plates using the Tesseract OCR engine, making it simple for users to find their licence plate numbers. When manually entering licence plate numbers is not possible or desirable, this tool gives ease.

The system's third function focuses on giving vehicle data based on licence plate numbers. By manually entering a number plate number into a search field, users can instruct the system to get pertinent data from a large automotive database. This database includes information on things like car models, years of registration, car colours, and countries of origin. The method makes it possible for users to acquire crucial information about an automobile through manual text searches, simplifying chores like checking a car's ownership, registration, and history.

These components work together to provide a powerful and adaptable Licence Plate Detection and Car Information System. The system offers a seamless and effective user experience, providing immense value in a variety of domains including law enforcement, parking management, and automotive services. It can detect licence plates in real-time from camera feeds, extract them from uploaded photos, or retrieve car information through manual text searching.

II LITERATURE SURVEY

Paper Name: An Automatic Number Plate Recognition System for Car Park Management

Author: Mutua Simon Mandi, Bernard Shibwabo.

Automatic Number Plate Recognition (ANPR) is an internationally recognized methodology that is used in vehicle identification. ANPR systems allow for real time recognition of a vehicle's number plate. Vehicle parking is an important component within any transportation system, whereby vehicles are often parked at destinations. With an increased number of motor vehicles on roads especially in developing countries, there is need for a vehicle identification mechanism that is effective, affordable and efficient. There are also increased insecurity challenges including terrorism which call for increased surveillance.

Paper Name: Automated License Plate Recognition: A Survey on Methods and Techniques

Author: ITHMI SHASHIRANGANA, HESHAN PADMASIRI, DULANI MEEDENIYA

With the explosive growth in the number of vehicles in use, automated license plate recognition (ALPR) systems are required for a wide range of tasks such as law enforcement, surveillance, and toll booth operations. The operational specifications of these systems are diverse due to the differences in the intended application. For instance, they may need to run on handheld devices or cloud servers, or operate in low light and adverse weather conditions. In order to meet these requirements, a variety of techniques have been developed for license plate recognition. Even though there has been a notable improvement in the current ALPR methods, there is a requirement to be filled in ALPR techniques for a complex environment. Thus, many approaches are sensitive to the changes in illumination and operate mostly in daylight. This study explores the methods and techniques used in ALPR in recent literature. We present a critical and constructive analysis of related studies in the field of ALPR and identify the open challenge faced by researchers and developers. Further, we provide future research directions and recommendations to optimize the current solutions to work under extreme conditions.

Paper Name: Car Number Plate Recognition System

Author name: Melba Lira D'souza, Brenda Meena D'souza

The objective is to design an efficient vehicle identification system using the vehicle number plate. The system is implemented for a Housing society or a private colony. The system first loads the image of vehicle registration plate. OCR technique is used for character recognition. The original image which is stored in the application folder will be compared with the loaded image. The system will then verify whether the image is original or fake if the image is authenticated the gate will open indicated by glowing green led else gate will remain closed and a message will be sent to the security personnel.

III METHODOLOGY

3.1 Objective

1. Installation and Setup: Set up the necessary dependencies, including Streamlit, Easy OCR, PyTesseract, and OpenCV, to create a functional environment for license plate recognition.

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2. License Plate Data Acquisition: Gather a comprehensive dataset of license plate images to train the object detection model and validate the system's performance.
3. Training an Object Detection Model: Utilize the annotated license plate dataset to train an object detection model. This model will enable the system to detect license plates accurately and efficiently.
4. License Plate Detection: Implement the trained object detection model to detect license plates in images or real-time video streams. The system will highlight the regions of interest (ROIs) where license plates are present.
5. License Plate Detection from Uploaded Photos:

- Allow users to upload an image containing a car's number plate.
- Apply image processing techniques to preprocess the uploaded image.
- Utilize the Tesseract OCR engine to extract the text from the license plate region.
- Display the extracted license plate number along with the processed image to the user.

6. Manual Text Searching of Car Information

- Enable users to manually enter a license plate number in a search bar.
- Implement a car information database containing license plate numbers, car models, registration years, car colors, and countries of origin.
- Search for the entered license plate number in the database.
- Display the corresponding car information, if available, to the user.

7. Optical Character Recognition (OCR): Apply OCR techniques, such as Easy OCR and PyTesseract, to extract the text from the identified ROIs. This process allows for the recognition of alphanumeric characters present on the license plates.
8. Output ROIs and Results: Display the detected license plate ROIs along with the recognized text on the user interface, created using Streamlit. The system will provide the user with visual feedback and accurate license plate information.

3.2 System Overview

A. EXTERNAL INTERFACE REQUIREMENT

User Interface

License Plate Recognition System using deep learning approach

Hardware Interfaces:

RAM: 8GB

As we are using Machine Learning Algorithm and Various High Level Libraries Laptop RAM minimum required is 8 GB.

Hard Disk : 40 GB

Data Set of Scan images is to be used hence minimum 40 GB Hard Disk memory is required.

Processor: Intel i5 Processor

Jupyter Notebook IDE that Integrated Development Environment is to be used and data loading should be fast hence Fast Processor is required IDE: Jupyter Notebook Best Integrated Development Environment as it gives possible suggestions at the time of typing code snippets that makes typing feasible and fast.

Coding Language: Python

Version 3.5

Highly specified Programming Language for Machine Learning because of availability of High Performance Libraries.

Operating System: Windows 10

Latest Operating System that supports all type of installation and development Environment

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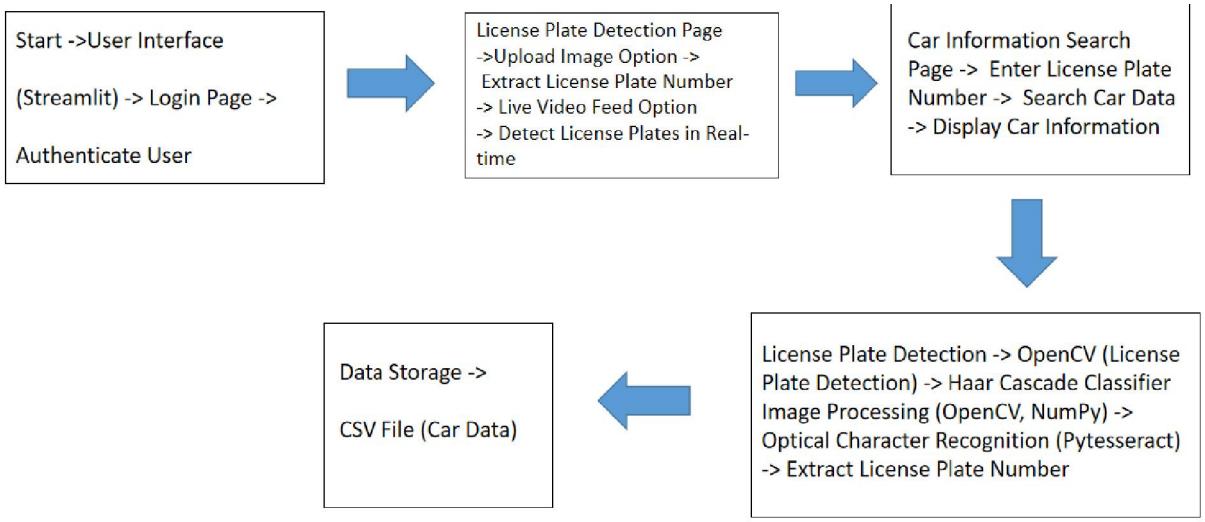
Software Interfaces

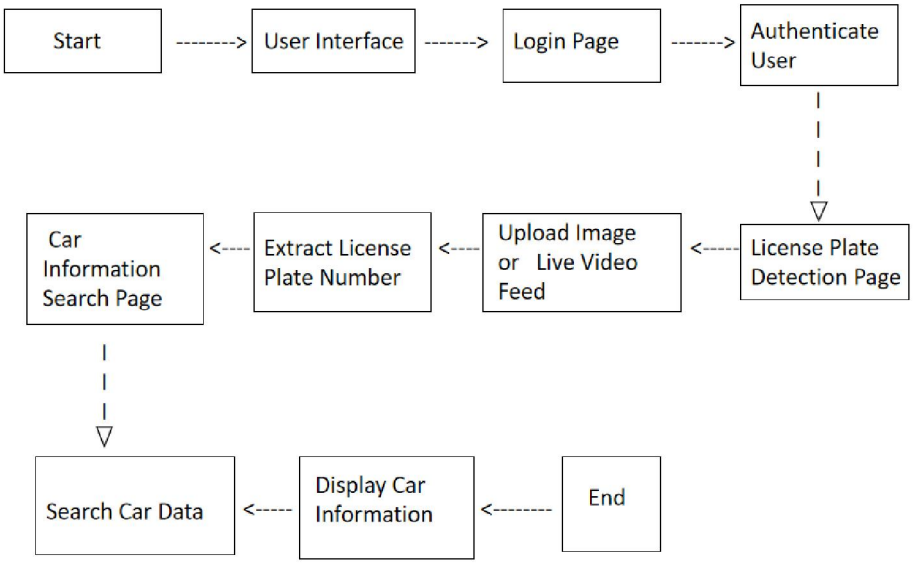
Operating System: Windows 10
IDE: VS Code
Programming Language: Python

IV. SYSTEM ARCHITECTURE



VI. UML DIAGRAMS

Unified Modeling Language is a standard language for writing software blueprints. The UML may be used to visualize, specify, construct and document the artifacts of a software intensive system. UML is process independent, although optimally it should be used in process that is use case driven, architecture centric, iterative and incremental. The number of UML Diagram is available



VII CONCLUSION

1. License Plate Detection from Uploaded Photos: Users can upload an image containing a car's number plate. The application applies image processing techniques and utilizes the Tesseract OCR engine to extract the text from the license plate. The detected license plate number is displayed along with the processed image.

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2. Manual Text Searching of Car Information: Users can manually enter a license plate number in the search bar. The application searches for the entered license plate number in a dataset containing car information. If a match is found, the corresponding car information, including the car model, registration year, car color, and country of origin, is displayed.
3. Real-time License Plate Detection from Live Video Feed: The application can utilize the webcam to capture a live video feed. It applies license plate detection algorithms on the frames in real-time, identifying license plates within the video stream. The detected license plate numbers are displayed on the video feed in real-time.
4. Background and Styling: The application incorporates background images and styling to enhance the visual appeal of the user interface.

In conclusion, the implemented application combines license plate detection capabilities from uploaded photos and live video feed with manual text searching of car information based on the license plate number. It provides a convenient way to extract license plate information from images and search for corresponding car details.

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