V Semester
Mini Project
Report On

(Automatic Licence Plate Detection System with Python)

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B. Tech(CSE)

Submitted by:

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DECLARATION

I, **Vipul Chauhan** student of **B-tech, Semester 5,** Department of Computer Science and Engineering, Graphic Era Hill University, Dehradun, declare that the technical project work entitled " **Automatic Licence Plate Detection System** " has been carried out by me and submitted at the beginning of 6th semester for the award of degree in B- tech of **Graphic Era Hill University** during the academic year **2022-2023**. The matter embodied in this synopsis has not been submitted to any other university or institution for the award of any other degree or diploma.

Date: 04/02/23

CERTIFICATE

This is to certify that the project report entitled
"Automatic Licence Plate Detection System
" is a bonafide project work carried out by Vipul
Chauhan , Roll no- 2018855. in partial
fulfilment of award of degree of B- tech of
Graphic Era Hill University, Dehradun during
the academic year 2022-2023. It is certified that
all corrections/suggestions indicated for
internal assessment have been incorporated.
The project has been approved as it satisfies the
academic requirements associated with the
degree mentioned.

ACKNOWLEDGEMENT

Here by I am submitting the project report on **"Automatic Licence Plate Detection System "** as per the scheme of Graphic Era Hill University, Dehradun.

I would like to express my sincere thanks to my project Co-Ordinator Ms. Preeti Chaudhary, and my project guide Ms. Aditya Verma for their patience, support and encouragement throughout the completion of this project and having faith in me.

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AUTOMATIC LICENCE PLATE DETECTION SYSTEM

PROBLEM STATEMENT

Automatic license plate detection is a technology used to automatically identify and recognise the license plates of vehicles. The problem statement for an automatic license plate detection system can be defined as follows:

1. Recognition of license plates from various angles and under varying lighting conditions.

2. Identification of license plates in real-time, even in crowded or busy scenes.

3. Ability to handle multiple languages and character sets, including special characters and symbols.

4. High accuracy and low error rates in license plate detection and recognition.

5. Integration with other systems, such as traffic management systems and databases.

The goal of an automatic license plate detection system is to accurately and efficiently identify and recognise license plates, while providing real-time data to support various applications and systems.

INTRODUCTION

Automatic License Plate Detection (ALPD) is an important technology in the field of intelligent transportation systems. It is used to automatically identify and recognise the license plates of vehicles. The technology plays a crucial role in various applications such as traffic management, security, and law enforcement. With the increasing number of vehicles on the road, there is a growing need for effective and efficient ALPD systems that can handle large amounts of data and provide real-time information.

This technology uses computer vision algorithms and machine learning techniques to recognise license plates, regardless of lighting conditions, vehicle make and model, or other factors that may impact recognition accuracy. In this paper, we will provide an overview of the ALPD system, including its problem statement, technical challenges, and recent developments in the field.

A BRIEF MOTIVATION FOR DOING THE PROJECT

The motivation behind developing an automatic license plate detection system is to improve the efficiency and accuracy of license plate recognition. The increasing number of vehicles on the road has made manual license plate recognition a time-consuming and error-prone task. With the help of ALPD technology, it is possible to automate the process and reduce the dependency on manual labor.

Additionally, ALPD systems can provide real-time information, which can be used in various applications such as traffic management, security, and law enforcement. The technology can help in monitoring and controlling the flow of traffic, reducing congestion, and improving road safety.

Moreover, the integration of ALPD with databases and other systems can provide valuable information for various applications, including toll collection, parking management, and criminal investigations.

In conclusion, the motivation behind developing an automatic license plate detection system is to improve efficiency, accuracy, and safety in license plate recognition, while providing real-time information for various applications and systems.

WORK FLOW

The workflow of this automatic license plate detection system typically involves the following steps:

1. Image Acquisition: The first step in the ALPD system is to acquire an image of a vehicle. This can be done through various sources such as cameras, surveillance systems, or mobile devices.

2. Image Pre-processing: The acquired image is pre-processed to improve the quality and reduce noise. This includes techniques such as colour correction, image resizing, and noise reduction.

3. License Plate Detection: In this step, the system identifies and locates the license plate within the image. This is typically done using computer vision algorithms such as edge detection, blob analysis, or deep learning techniques.

4. Character Segmentation: Once the license plate is detected, the system segments the characters within the plate to prepare for recognition.

5. Character Recognition: The system uses machine learning algorithms to recognise and classify the characters within the license plate. This includes techniques such as optical character recognition (OCR), neural networks, or support vector machines (SVM).

6. License Plate Recognition: The recognised characters are combined to form the license plate number, which is then recognised and verified by the system.

7. Result Output: The final step is to output the recognised license plate information, which can be used for various applications and systems, such as traffic management, security, and law enforcement.

TOOLS USED

1. TensorFlow: TensorFlow is an open-source machine learning framework that can be used to train and develop deep learning models for image recognition and object detection.

2. OpenCV: OpenCV is an open-source computer vision library that provides a wide range of image processing and computer vision algorithms. It can be used for tasks such as image pre-processing, edge detection, and blob analysis.

3. Python: Python is a high-level programming language that is widely used in the field of machine learning and computer vision. It offers a variety of libraries and tools for developing ALPD systems, including TensorFlow and OpenCV.

4. Neural Networks: Neural networks are a type of machine learning algorithm that can be used to recognise characters within license plates. They can be trained on large datasets to improve accuracy and efficiency.

5. Optical Character Recognition (OCR): OCR is a technology that can be used to recognise and classify characters within images. It can be integrated into the ALPD system to improve character recognition accuracy.

METHODOLOGY

1. Edge Detection: Edge detection algorithms are used to identify the boundaries between objects within an image. This information can be used to locate and detect the license plate within the image.

2. Blob Analysis: Blob analysis algorithms are used to identify and isolate objects within an image based on their shape, size, and other characteristics. This information can be used to detect the license plate and segment the characters within it.

3. Convolutional Neural Networks (CNNs): CNNs are a type of deep learning algorithm that can be used for image recognition and object detection. They can be trained on large datasets to improve accuracy and efficiency in license plate recognition.

4. Optical Character Recognition (OCR): OCR algorithms can be used to recognise and classify the characters within the license plate. This can be done using machine learning techniques, such as neural networks or support vector machines (SVM).

5. Template Matching: Template matching algorithms can be used to compare the detected license plate with a set of predefined templates to improve recognition accuracy.

CONCLUSION

In conclusion, an automatic license plate detection system is a crucial component in various applications, such as traffic management, security, and law enforcement. The system typically involves the steps of image acquisition, pre-processing, license plate detection, character segmentation, recognition, and result output.

It can be implemented using a combination of computer vision algorithms and machine learning techniques, including edge detection, blob analysis, convolutional neural networks, optical character recognition, and template matching. The choice of algorithms and tools will depend on the specific requirements and constraints of the system, such as processing time, accuracy, and cost. The ALPD system can be continuously developed and optimised to improve its efficiency and accuracy.

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