IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# NUMBER PLATE RECOGNITION USING OPENCV

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*Abstract:* With the popularization of automobile and the progress of computer vision detection technology, intelligent license plate detection technology has gradually become an important part of intelligent traffic management. License plate detection is used to segment vehicle image and obtain license plate area for follow-up recognition system to screen. It is widely used in intelligent traffic management, vehicle video monitoring and other fields. In this paper, two license plate detection methods are studied, one is based on Sobel edge detection and the other is based on morphological gradient detection. Basing on OpenCV and PYTHON under Windows system, two methods of license plate detection are implemented, and the two algorithms are compared in detail from the aspects of license plate detection accuracy. These methods have high efficiency and good interactivity, which provide a reference for later license plate recognition.

## I. INTRODUCTION

Optical Character Recognition, or OCR, is a technology that enables people to convert different types of documents, such as scanned paper documents, PDF files or images captured by a digital camera into editable and searchable data. Imagine there is a paper document - for example, magazine article, brochure, or PDF contract a person sent to another person by email. Obviously, a scanner is not enough to make this information available for editing, say in Microsoft Word. All a scanner can do is create an image or a snapshot of the document that is nothing more than a collection of black and white or color dots, known as a raster image. In order to extract and repurpose data from scanned documents, camera images or image-only PDFs, it needs an OCR software that would single out letters on the image, put them into words and then - words into sentences, thus enabling peopleto access and edit the content of the original document.

OCR is a field of research in pattern recognition, artificial intelligence and computer vision. OCR engines have been developed into many kinds of domain-specific OCR applications, such as receipt OCR, invoice OCR, check OCR, legal billing document OCR. Theycan also be used for Automatic number plate recognition.

OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision and also a machine learning software library. Opencv was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD-licensed product, OpenCV makes it easy for businesses to utilize and modify the code. In this project OpenCV includes a statistical machine learning library that contains k-nearest neighbor algorithm which is coded in Python (a widely used dynamic programming language).

MainAimofthisprojectistodevelopaLicensePlateRecognitionsoftwarewhichrecognises different types of characters in an image and gives specific extracted output in text format.

The objective of this project is to extract characters from a License Plate with the use of computer vision libraries and algorithms. A suitable algorithm needs to be constructed and trained for different set of images. The program code has to be written in Python with the inclusion of suitable OpenCV libraries. The program should be able to extract the characters and print the output in text format for training purpose.

## II. LITERATURE SURVEY

In[1] The project will aim to develop a smart car plate recognition device that can monitor and survey the area, as well as detect and analyze vehicle license plates. A sensor will detect the incoming vehicle, then a camera will take a screenshot of the front of the vehicle with the license plate. The license plate is scanned then checked whether it is registered to determine whether it is allowed or denied entry, and the device will troubleshoot by sending SMS to a fixed phone number regarding any issues.

In[2] The proposed system performs knowledge generation through data clustering mechanism. Further, the hidden information pattern within the database of detected number plates is used to provide insight into the vehicle information towards

decision making and analysis. The experimentation results of the proposed system show 85.3% of from plate recognition, 90.5% for rear plate, 83.2% of localization and 80.5 % of character segmentation and 73.4 % of character recognition.

In[3] This device is utilized indensely populated region to spot the vehicles which are violating the traffic rules, are handed down in malls to allot automobile parking space, identification of the stolen vehicles and also helpful in crime scene investigation. Image of the vehicle is pre-processed by reading the image from a dataset (b) converting it into a gray-scale image and (b) by removing the noises from the image using Gaussian techniques. This number plate is extracted from the image by implementing the contour enhancement method and on extracted characters, machine learning algorithms are used to train the model to perform the segmentation. Within the character recognition process, we classify the characters. The proposed number plate detection technique shows significant improvement in accuracy rate when compared with standard existing systems.

In[4] The proposed system was evaluated on LP datasets from five countries which include South Korea, Taiwan, Greece, USA, and Croatia. In addition, a small dataset containing LPs from 17 countries was collected to evaluate the effectiveness of the multinational LP layout detection algorithm. The proposed ALPR system consumes about 42 ms per image on average for extracting LP number. Experimental results demonstrate the effectiveness of our ALPR system.

In[5] The growing population of Nigeria has subsequently led to a higher number of cars on the road. This has resulted in an increase in traffic violations and road-related crimes such as hit and run, kidnappings, robbery, etc. which have all contributed to road insecurity in the country. It has also made it increasingly difficult to keep track of vehicles for law enforcement and traffic management. Number plate recognition is still majorly carried out manually in most parts of Nigeria, which is neither efficient nor effective. 5

## III. METHODOLOGY

**Approach:**

To solve the defined character recognition process the python coded algorithm with OpenCVlibraries is used. The processing of code is divided into the next categories:

- Image acquisition
- Pre-processing
- Feature extraction
- Detection/segmentation
- High-level processing
- Decision making
- OCR

Licenseplaterecognitionisatechnologythatusesopticalcharacterrecognitiononimages to read vehicle registration plates. It can use existing closed-circuit television, road-rule enforcement cameras, or cameras specifically designed for the task. It is used by police forces around the world for law enforcement purposes, including to check if a vehicle is registered or licensed. It is also used for electronic toll collection on pay-per-use roads and as a method of cataloging the movements of traffic for example by highways agencies.

**OpenCV**

OpenCV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications. Being a BSD-licensed product, OpenCV makes it easy for anyone to utilize and modify the code.

***k*-nearest neighbors algorithm (*k*-NN)**

OpenCV includes a statistical machine learning library that contains k-nearest neighbor algorithm which is coded in Python (a widely used dynamic programming language).

In pattern recognition, the *k*-Nearest Neighbors algorithm (or *k*-NN for short) is a non-parametric method used for classification and regression. In both cases, the input consists of the *k* closest training examples in the feature space. The output depends on whether *k*-NN is usedfor classification or regression:

In *k-NN* classification, the output is a class membership. An object is classified by a majority vote of its neighbors, with the object being assigned to the class most common amongits *k* nearest neighbors (*k* is a positive integer, typically small). If $k = 1$, then the object is simply assigned to the class of that single nearest neighbor. In *k-NN regression*, the output is the property value for the object. This value is the average of the values of its *k* nearest neighbors.

***Image acquisition***

A digital image is produced by one or several image sensors i.e light-sensitive cameras. The pixel values typically correspond to light intensity in one or several spectral bands (gray images or colour images), but can also be related to various physical measures, such as depth,absorption or reflectance of sonic or electromagnetic waves.

**Pre-processing**


*Figure 1 Input Image*

Before a computer vision method can be applied to image data in order to extract somespecific piece of information, it is usually necessary to process the data in order to assure that itsatisfies certain assumptions implied by the following methods,

- Noise reduction in order to assure that sensor noise does not introduce false information.
- Contrast enhancement to assure that relevant information can be detected.
- Re-sampling in order to assure that the image coordinate system is correct.
- Scale space representation to enhance image structures at locally appropriatescales.


*Figure 2 Binary Thresold Image*

**Feature extraction**

Image features at various levels of complexity are extracted from the image data. Typicalexamples of such features are:

- Lines, edges and ridges.
- Localized interest points such as corners, points, etc.
- More complex features may be related to texture, shape or motion.

Detection/segmentation

At some point in the processing a decision is made about which image points or regions of the image are relevant for further processing. For example

- Selection of a specific set of interest points
- Segmentation of one or multiple image regions which contain a specific objectof interest.

**High-level processing**

At this step the input is typically a small set of data, a set of points or an image regionwhich is assumed to contain a specific object. The remaining processing deals with

- Verification of data that satisfy model-based and application specific assumptions.
- Estimation of application specific parameters, such as object pose or object size.
- Image recognition – classifying a detected object into different categories.
- Image registration – comparing and combining two different views of the sameobject.

**Decision making**

Making the final decision required for the following applications:

- Pass/fail on automatic inspection.
- Match / no-match in recognition.

Detection/segmentation

At some point in the processing a decision is made about which image points or regions of the image are relevant for further processing. For example


*Figure 3 Output Image*

- Selection of a specific set of interest points
- Segmentation of one or multiple image regions which contain a specific objectof interest.

## IV. CONLUSION

The message of this research is to show that free and open source technologies are matured enough for scientific computing domains**.** The system works satisfactorily for wide variations in illumination conditions and different types of number plates commonly found in India. It is definitely a better alternative to the existing proprietary systems, even though there are known restrictions.

This Project provides an implementation of License Plate Recognition using Optical Character Recognition(OCR) which is an electronic conversion of images of typed, handwrittenor printed text into machine-encoded text. The project was able to study and resolve algorithmic and mathematical aspects of the License Plate Recognition systems, such as problematic of computer vision, pattern recognition, OCR & Neural networks.

License Plate Recognition solution has been tested on static snapshots of vehicles, which has been divided into several sets according to difficulty. Sets of blurry and skewed snapshots give worse recognition rates than a set of snapshots which has been captured clearly. The main objective of this project was not to find a one hundred percent recognizable set of snapshots, but to test the invariance of the algorithms on random snapshots systematically classified to the sets according to their properties.

Source code obtained from different references could extract the characters up to only 5 in number, Improvisation of this source code is done to extract more than 8 characters to reach indian standards. This is achieved by changing the dimensions of best possible outcome of license plate region.

## REFERENCES

1. M. Al-Mheiri, O. Kais and T. Bonny, "Car Plate Recognition Using Machine Learning," 2022 Advances in Science and Engineering Technology International Conferences (ASET), 2022, pp. 1-6, doi: 10.1109/ASET53988.2022.9734830.

2. R. Agrawal, M. Agarwal and R. Krishnamurthi, "Cognitive Number Plate Recognition using Machine Learning and Data Visualization Techniques," 2020 6th International Conference on Signal Processing and Communication (ICSC), 2020, pp. 101-107, doi: 10.1109/ICSC48311.2020.9182744.

3. K. Anusha, S. Nachiyappan, M. Braveen, K. V. Pradeep and S. R. Yarlagadda, "A Simple Number Plate Detection Technique with Support Vector Machine for On-Road Vehicles," 2022 International Virtual Conference on Power Engineering Computing and Control: Developments in Electric Vehicles and Energy Sector for Sustainable Future (PECCON), 2022, pp. 01-06, doi: 10.1109/PECCON55017.2022.9851000.

4. C. Henry, S. Y. Ahn and S. -W. Lee, "Multinational License Plate Recognition Using Generalized Character Sequence Detection," in IEEE Access, vol. 8, pp. 35185-35199, 2020, doi: 10.1109/ACCESS.2020.2974973.

5. F. A. Aiyelabegan, C. C. Emmanuel, S. Thomas, F. A. Imam, H. Haruna Ginsau and F. Onah, "Proposed Automatic Number Plate Recognition System Using Machine Learning," 2022 IEEE Nigeria 4th International Conference on Disruptive Technologies for Sustainable Development (NIGERCON), 2022, pp. 1-5, doi: 10.1109/NIGERCON54645.2022.9803181.