Chapter 16
License Plate Detection and Location for Fast Character Segmentation

Juan Alberto Antonio Velázquez
Tecnológico de Estudios Superiores de Jocotitlán, Mexico

Leopoldo Gil Antonio
Tecnologico de Estudios Superiores de Jocotilán, Mexico

Ociel Felipe Gómez
Colegio de Estudios Científicos y Tecnológicos, Mexico

Hector Caballero Hernandez
Tecnologico de Estudios Superiores de Jocotilán, Mexico

Erika López González
Tecnologico de Estudios Superiores de Jocotilán, Mexico

ABSTRACT

In the State of Mexico, millions of vehicles circulate every day, so the identification of their license plates through CCTV cameras is an arduous job that requires trained personnel to capture important scenes. However, automatic plate recognition has factors that prevent correct detection. These can be problems such as weather, rusty plates, lighting, etc. A method of detecting plates located in any part of the vehicle is proposed and by means of a convolutional neural networks (CNN) algorithm using Tensor Flow. This is located, and then the text is segmented with the use of a threshold. The proposed model consists of a set of 355 individually obtained license plate images of the State of Mexico, which will serve to train the model. The main contribution of this work is the detection of vehicle plates anywhere, in addition to the implementation of a threshold with a value of 155 as the optimal value. The methodology was validated with the use of 50 new images of car plates registered in the vehicle registry of the State of Mexico, reaching an accuracy of 92.56% effectiveness.

DOI: 10.4018/978-1-6684-5624-8.ch016

Copyright © 2023, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

INTRODUCTION

In the State of Mexico, currently 2 million vehicles circulate per day, these present road problems such as reports of theft, collisions between vehicles, etc. So the traffic department of the state government has a staff assigned to control this large number of incidents. That is why strategies have been implemented to detect the plates of these vehicles, such as the installation of closed-circuit television cameras (CCTV), but the personnel assigned to identify these problems in the cameras is not enough, also observing problems of fatigue or staff distractions. that monitors these cameras, with which they let events pass where there may be events such as vehicular mishaps, among others.

In this paper we present a technique based on convolutional neural network using the TensorFlow platform, to subsequently apply the segmentation technique based on the threshold for the detection of the characters of the vehicle license plate. Once threshold technique is applied, the binarized characters contain noise, so it is necessary to implement techniques based on mathematical morphology, to leave only the characters on the plate.

Preliminaries

The recognition of vehicle license plates has been studied in the state of the art, have served to search for techniques that help each time to detect vehicle license plates in spite of the mentioned problems. The most relevant work being done in relation to license plate detection is mentioned below.

In (Lubna, Mufti, & Ali Shah, 2021), a detailed review of current technologies and advances in Automatic Number Plate Recognition (ANPR) systems is presented. With a complete comparison of the performance of different algorithms tested and simulated in real time. ANPR technology can detect the identification of vehicles through their license plates using identification techniques. Successful implementation of the ANPR system may require additional hardware to increase the accuracy of the system. License plate status, non-standard format, complex scene, camera quality, camera installation position, distortion tolerance, image quality, etc. Camera stabilization position, distortion tolerance, motion blur, contrast issues, reflections, display and processing limitations and memory, environmental conditions, indoor/outdoor or day/night photography, software tools. Their study aims to improve the state of the art in Intelligent Transportation Systems (ANPR) based on computational vision algorithms.

On the other hand, in (R.C. Chen et al, 2019), they designed a prototype called Automatic Plate Recognition (ALPR), based on a deep learning framework using YOLO, where they occupy 7 convolutional layers for plate recognition with the use of a sliding window that detects the digits of the plate. Finally, an accuracy of 96.94% is obtained in the recognition of the characters on the plate. On the other hand (W Puarungroj & N. Boonsirisumpun, 2018), carried out motorcycle license plate detection, such license plate recognition system combines 2 subsystems of license plate detection and recognition by deep learning (MobileNets and Inception-v3), presenting an accuracy of 96.94% in line recognition and 91.76% in character recognition. However (Z. Selmi, M.B. Halima, U. Pal, & M.A. Alimi, 2020), design automatic license plate recognition (ALPR) systems, used in very complicated environments, are based on convolutional neural networks (CNN) and tested on four license plate datasets with different characteristics such as: orientation, low quality images, blurred and license plates with complex backgrounds. In the end, an accuracy of 99.3% in license plate detection is reported.

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/license-plate-detection-and-location-for-fast-character-segmentation/312635

Related Content

An Approach to Ensure Secure Inter-Cloud Data and Application Migration Using End-to-End Encryption and Content Verification
Koushik S.and Annapurna P. Patil (2022). *International Journal of Ambient Computing and Intelligence (pp. 1-21).*
www.irma-international.org/article/an-approach-to-ensure-secure-inter-cloud-data-and-application-migration-using-end-to-end-encryption-and-content-verification/293148

Role of AI in Advancing Pharmacology
Manish Pathak (2025). *AI-Powered Advances in Pharmacology (pp. 1-14).*
www.irma-international.org/chapter/role-of-ai-in-advancing-pharmacology/356856

Effects of Team Collaboration on Sharing Information Security Advice: Insights from Network Analysis
Duy Dang-Phamand Mathews Nkhoma (2021). *Research Anthology on Artificial Intelligence Applications in Security (pp. 1900-1915).*
www.irma-international.org/chapter/effects-of-team-collaboration-on-sharing-information-security-advice/270677

Speech-to-Speech Conversion: An Approach to Enhance the Speech Intelligibility of Dysarthric Speaker
Siddhanna Janai, Shreekanth T., Chandan M.and Ajish K. Abraham (2021). *International Journal of Ambient Computing and Intelligence (pp. 184-206).*
www.irma-international.org/article/speech-to-speech-conversion/272044

Ambient Intelligence for Eldercare – the Nuts and Bolts: Sensor Data Acquisition, Processing and Activity Recognition Under Resource Constraints
Jit Biswas, Andrei Tolstikov, Aung-Phyo-Wai Aung, Victor Siang-Fook Fooand Weimin Huang (2011). *Handbook of Research on Ambient Intelligence and Smart Environments: Trends and Perspectives (pp. 392-423).*
www.irma-international.org/chapter/ambient-intelligence-eldercare-nuts-bolts/54668