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Plate Number Real-time Recognition Using Tesseract OCR

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Abstract:

The importance of data collection is emphasized by mobile real-time license plate recognition. It identifies the plate number itself after performing the method of license plate extraction of character with the help of the Tesseract OCR algorithm. To make the system easier to use, the mechanism worked on smartphone devices.As a result,vehicle processing as a useful resource for information exchange. The plate number can be captured using the system and will be subjected to segmentation in order to have a clear image that the system can read. After that, the location is found and can be sent to the user's contacts to notify them in the event of an emergency that the alarm button can be activated.The study discovered that the Tesseract OCR algorithm's ability can aid in real-time text recognition of captured license plate images. The OCR-Tesseract -Algorithm reaches 89 percent of the 5 different record controls.

Keywords —Tesseract OCR algorithm, Real-time license plate recognition.

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I. INTRODUCTION

Vehicle license plates were first invented and used for carriages, but not for cars or motor vehicles. The license plate was initially established in Victoria, Canada, in 1884 for a hackney vehicle driven by horses. The first license plate requirement in the world was implemented on August 14, 1983, in France passed a law making all license plates be registered. They must provide their name, address, and phone number (Wu & Li, 2011).

LPR (License Plate Recognition) is a challenge that aims to identify automobiles by detecting license plates as well as recognizing the vehicle's license plate.

Vehicle tracking systems were originally developed for the shipping business, but as technology advances, they are now utilized in several ways to track and display vehicle locations in real-time. Automatic Vehicle Location (AVL) is a vehicle tracking system used by fleet operators to track their cars' movements. This method is primarily dependent on GPS, in which a GPS receiver communicates with a satellite to obtain location and other critical data (Lee et al., 2014).

The fight against crime is a difficult and never-ending one. Law enforcement officers must always be on the lookout for dangers, and they must have many tools at their disposal as possible to keep safe while safeguarding the public. A license plate recognition system is one of the most useful tools that security personnel may have (LPR). Tracking the movements of criminals is always difficult but employing an LPR can help make it a bit easier.

The research will be focused on plate number real-time recognition using tesseract OCR, In the section

II would give a brief discussion about the different study in plate number detection which is this study is based upon. Section III is about the algorithm that been used, Section IV would be discussing the data and results. While the V will about the findings and discussion. VI is aboutconclusions and further research about the study of plate number real-time recognition using tesseract OCR.

II. LITERATURE REVIEW

The number of vehicles has been increasing in the last few years, and because of that, there have been several cases of kidnapping, hold-up, rape, accidents, or reckless driving, making it increasingly challenging to track them and impossible to identify the owners of the vehicles. These are continuously reported. There are various approaches and studies on plate number real-time recognition, but the majority of them are not used in real-time. That's why we propose our system to help commuters, and the following are the objectives of the system. First to prevent crimes and reassure passengers that using taxicab transportation is safe. Second to provide passengers with the exact location and identifying the vehicle owner's information. Third to develop a system that will help the passengers to protect their self.

Based in the study of (Jose et al., 2021) they used an LP recognition model to identify Philippine license plates in road traffic photos, as well as separate character detection models for each LP series to distinguish alphanumeric characters.

According to the (Yim et al., 2020) When an image is scanned, the system does not identify text and instead reads a sequence of bits with varying colors. OCR analyzes the patterns of black and white pixels to determine the scanned character. The inscription on the vehicle's license plate is read. The pixel pattern was identified, and the pattern was compared to the most comparable pattern recorded in the data, which is the foundation of OpenALPR.

According to the (Jyoti Verma, 2019)It performs segmentation and optical character recognition (OCR) concurrently in the localized plate region by utilizing a probabilistic illation approach backed by hidden Andre Mark-off models (HMMs), where the most likely code sequence is determined by applying the Viterbi rule.

The investigation conducted by(Karwal & Girdhar, 2015) In the Indian context, the reduction of the picture backdrop and the elimination of non-uniform light performed well. The cross-correlation comparison between template character and simulated data is shown by employing the normalized template cross correlation match.

In the analysis of (Mahalakshmi, 2017)Automatic License Plate Recognition (ALPR) has become a highly essential technology in the IT industry since it aids in vehicle monitoring and control. Unfortunately, due to the variety of plate formats (for ex., plate size, plate backdrop, character size, plate texture, and so on), efficient development of an ALPR system is a challenging task, especially in an open setting with varying lighting conditions during picture capture.

Based on the study (Malik et al., 2014) Automatic Number Plate Recognition (ANPR) and an Optical Character Recognition (OCR) system is employed to identify the plate's characters, which are subsequently relayed to by email to the toll plaza.

As stated by (Islam et al., 2016) The Optical character recognition (OCR) device that reads characters from a license plate picture. It is made up of a camera that takes a picture of a vehicle and locates the number plate. The characters are then identified using a character recognition program.

III. PROPOSED ALGORITHM

The plate number real-time recognition in this investigation was primarily done with Tesseract OCR. The algorithm's percent of confidence will be determined by scanning the numerous plate numbers. A picture will be used to represent five different plate numbers.

The conversion of scanned or printed text images is known as optical character recognition (OCR)(Shinde & Chougule, 2012). into editable text for further processing this technique enables the system to automatically recognize text.

In order to further describe how the program algorithm works, a simple flowchart of the general processes involved are shown in Figure 1, In the first step, the system basically reads the image input, and it will undergo in tesseract ocr process. For simplification, the plate number design that is new release by the LTO was set. Now, after the image is loaded, the machine then starts to read and perform the tesseract ocr algorithm. Typically, tesseract is a platform for optical character recognition (OCR) that is open source. OCR will extract text from images.

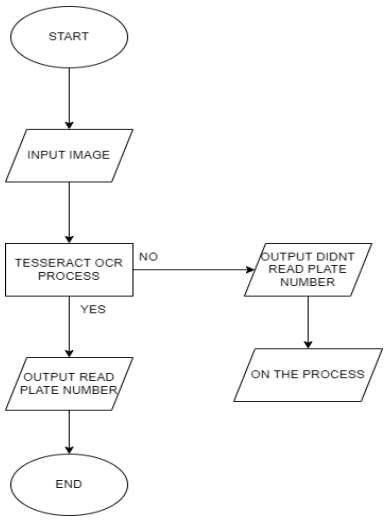

Figure 1:System Algorithm Flowchart showing Tesseract OCR

IV. DATA AND RESULTS

For this study, the system program was implemented using Tesseract OCR. In testing the program algorithm with different image inputs. the five-plate number was test to know the percent of confidence of each plate number. Having a testing of the system was done, in order to observe the strength and weaknesses on how close the programcan get to extracting images from text, within thepicture through a different angle.

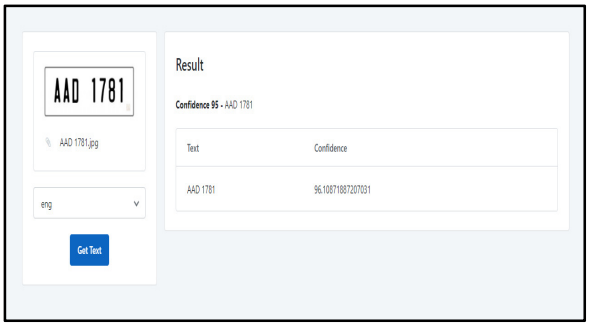

Figure 2:FIRST SAMPLE PLATE

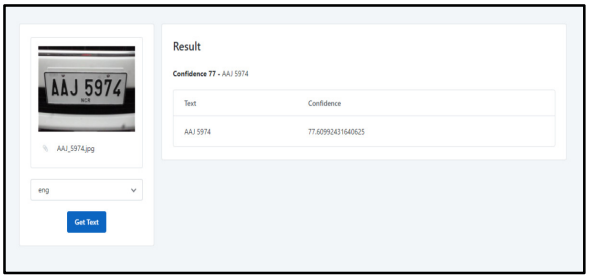

Figure 3: SECOND SAMPLE PLATE

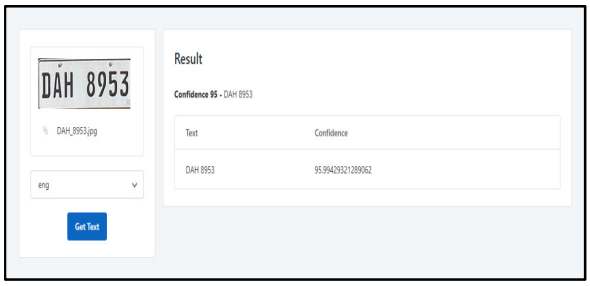

Figure 4: THRID SAMPLE PLATE

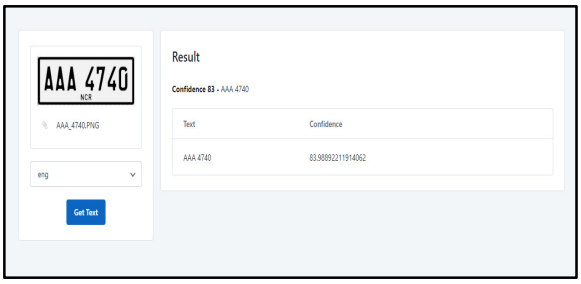

Figure 5: FOURTH SAMPLE PLATE

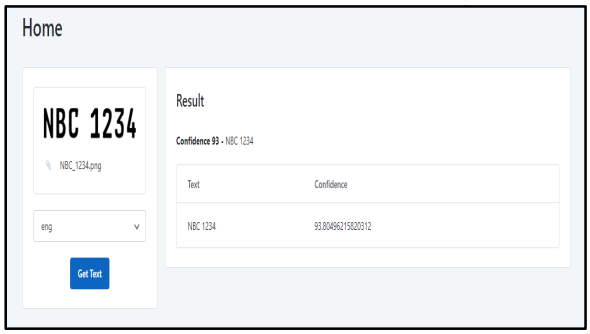

Figure 6: FIFTH SAMPLE PLATE

PLATE NUMBER SAMPLE	CONFIDENCE
Figure 2	84%
Figure 3	96%
Figure 4	78%
Figure 5	96%
Figure 6	94%

According to the figure above, the confidence of a Tesseract OCR can be greatly affected by different angles and character styles in the plate number; thus, it is highly recommended to capture the most recent plate number of the Philippines with a close shot to be read by our system.

V. FINDINGS AND DISCUSSION

The study discovered that the Tesseract OCR Algorithm's capability can aid in the recognition of text in real-time from captured images of vehicle plate numbers. Out of five different plate number tests, the Tesseract OCR algorithm achieves a total of 89 percent.

There are some limitations in our system, such as the following: it must be the most recent plate number model released by the LTO to be scanned, a proper angle shot with 1 span away from the plate number, and a clear image captured in order for the system to run smoothly.

To improve security, the SHA-512 Algorithm was used to secure the entire backend environment.

For interaction, the interface is made up of two environments: the web and mobile. Each of these has a significant role to play. Obtaining the implementation of communication between the driver and passenger accompanied by the administrator to facilitate their accounts is also important.

VI. CONCLUSIONS

Based on the findings of this research, the following conclusions were derived:

1. Based on the experiment, the Tesseract OCR Algorithm performs admirably in extracting text in real-time from captured images, with 89 percent accuracy.

2. The SHA-512 Algorithm ensures strong security in the backend environment, preventing attacker intrusion.

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