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THE AUTOMATED SCHEME FOR THE NUMBER PLATE DETECTION IN IMAGE PROCESSING USING YOLOV4 AND KNN

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ABSTRACT

Through the use of computer vision and image processing technology, the Automatic Number Plate Recognition system is able to achieve a variety of tasks, including the taking of photos of automobiles, the extraction of license plate information from the whole of the image, and the subsequent presentation of the information in text format. Generally speaking, the Automatic Number Plate Recognition (ANPR) system is comprised of four different stages. Character segmentation, character recognition, extraction of the number plate region, acquisition of the vehicle picture, and pre-processing are the processes that are included in this procedure. Both the output of the phase that extracts the number plate and the phases that segment and identify the characters have an impact on the overall accuracy and efficiency of the ANPR system. The output of the phase that extracts the number plate is used to extract the number plate. Noting that this is the situation is of the utmost importance. There is another aspect that might potentially have an impact on the precision of the Number Plate Extraction step, and that is the quality of the photographic image of the car that was acquired. There exists a direct connection between the quality of the input vehicle picture that was gathered and the quality of the findings that are presented in the subsequent paragraphs.

Keywords: - *Automatic Number, Plate Recognition, Recognition.*

INTRODUCTION

It is difficult to keep track of and manage all of the cars that are on the road in the contemporary world given the development in both the number of vehicles and the number of people who use them. This is because both the number of vehicles and the number of people who use them are growing. As a result of this, the License Plate Recognition System is very important in order to fulfill the ever-increasing need for traffic management. The purpose of license plates is to identify automobiles in a manner that is analogous to that of personal identifying numbers. Once the license plates of the cars that are important to the investigation have been identified, it is feasible to have access to all of the information that is required to be discovered about the vehicle. LPR is a tool that is both realistic and practical as a result of this effect.

The primary areas that the License Plate Recognition System is intended to cover are automated passage systems, toll collecting systems and toll roads, traffic monitoring and vehicle identification, and locations that need entrance and exit control. These are the areas that the system is planned to cover. Due to the fact that each of these procedures requires the involvement of a human, the amount of time that is necessary for processing is increased. The number of vehicles that are used in traffic today is increasing for a variety of reasons, including the proliferation of vehicle brands and models, the proliferation of manufacturing facilities producing automobiles at a rapid pace as a result of the revolution brought about by industry 4.0, and the

overall expansion in the population of the world. All of these factors are contributing to the current situation. It becomes more challenging to keep an eye on cars when there is a rise in the number of vehicles on the road, as well as an increase in the number of people who use autos to go to locations such as parking lots and shopping malls.

There are a great number of applications that are dependent on license plate recognition technologies. Parking and automated passageway systems, traffic management, and transportation monitoring and detection are some of the applications that fall under this category. This is due to the fact that a considerable amount of research has been conducted on the subject of license plate identification and the placement of license plates. When attempting to do plate recognition, it is often required to identify the region of the license plate in order to accomplish the task. The process of recognizing license plates used to include a large amount of image processing in the past. We regret to inform you that the implementation of this approach is somewhat challenging due to the presence of features such as poor contrast and unclean photographs, both of which need significant preprocessing.

As a direct result of the advancements that have been achieved in technology, this technology is also used by automobiles, which have evolved into an essential component of our everyday life. Additionally, vehicles that were first driven manually are now fully automated, and almost all new models are equipped with rear view cameras as standard equipment. This is a significant advancement from the past. The process of recognizing license plates and cars has become more simpler as a result of the installation of cameras inside automobiles. As a result, there is no longer a need for extra equipment. The technology that is able to detect license plates is becoming more crucial in determining whether or not specific individuals who are driving in automobiles are being followed in any manner. This is in addition to the concerns that have been highlighted in the past. The region around the license plate in the live camera photographs of the vehicles is the primary focus of the inquiry that is now being carried out. Because of this, the characters that constitute the license plate are rendered in a manner that is distinct from the rest of the visual representation. At last, the characters that were retrieved from the area of the license plate are included into the optimization algorithms that were developed for the purpose of the identification process. Once this is accomplished, the process of license plate recognition is said to have been effective.

Determining the Plate Area on the Vehicle

The initial step in this research is to locate the location within which the license plate is located. It is essential to determine the location of the license plate in the car photo in a way that is both accurate and free of errors. If there is a mistake made in this section, all of the data that is entered and received by the rest of the system will be rendered meaningless, which will result in the plate being illegible. It is possible to see the original photo of the license plate via Figure 1.

Figure 1. Original photo of the license plate

One of the first steps in the procedure is putting the original picture of the license plate into the technology. Each pixel in the image is characterized by one of three different color values. The RGB color space is comprised of the colors red, green, and blue. The range of values that are feasible for these pixel components is from 0 to 255. Following the completion of the calculation of the average values of R, G, and B for the color image that was provided to the system, the subsequent step is to determine the average values of these three colors. As a possible beginning point for determining our threshold, we might utilize this particular value. Immediately after the completion of these computations, a number of pre-processing operations will be carried out in order to remove any undesired sections from the picture.

initial, the image is converted to grayscale, which is the initial step in these methods. Taking this action will guarantee that the system is not hindered by any unnecessary information that may be included in the photograph. Both the grayscale brightness and contrast values of photographs may be different from one another due to the fact that they may have been taken at different times of the day. Images that were taken in cloudy or dim light have a tone that is more muted than those that were taken in full sunlight or other bright circumstances. Transforming the picture into grayscale in a consistent manner is the only approach to resolve the problems that may be caused by such an imbalance in the brightness of the image. The grayscale plate photo that was taken in its original form may be seen in Figure 2.

Figure 2. Original plate image taken in gray level

OBJECTIVE

1. To the research project on the automated system for detecting license plates in images.

2. To do this, you must be able to read the characters on the license plate and also find it inside the photograph.

METHODOLOGY

1. FEATURE EXTRACTION:

A video or a picture may be used as the source of the frames, which are then extracted from the input. It is necessary for us to identify the frame that contains the license plate among these objects. To remove any unnecessary information from the frame, the next step is to perform a pre-processing operation on it. Following that, the specific procedure is used in order to discover the license plate of the car. Partitioning the characters on the license plate is the next step in the process. After then, the DNN approach, in combination with CNN and RNN, is used in order to take advantage of the characteristics.

2. MODEL TRAINING:

To ensure that the model is able to acquire knowledge, it must be trained on the dataset. In this particular instance, the YOLOV4 model is used in the process of detecting and recognizing vehicle number plates on each and every photo. As far as object detection is concerned, this model is the best one available. YOLOV4 may be used in a variety of contexts. They are being trained to segment pictures according to a variety of items, which is the aim of their training. It is planned to give a bounding box for each and every object.

3. NUMBER PLATE DETECTION:

When employing earlier approaches, the recognition of license plates is mostly dependent on the extraction of scene features. They have developed a variety of methods for identifying license plates in the current day, including those that are based on edge, texture, and other factors. Because it enables us to go on to character segmentation and label identification, both of which are reliant on precise plate recognition, the detection of number plates is an essential part of this study. As a result, we need to consider a variety of different approaches in order to achieve reliable number plate identification. CNN-based object detectors have been used by a great number of authors ever since the advancements in Deep Learning.

As part of our investigation, we make use of YOLOV4 to implement the non-max suppression technique in the object identification process. Non-max suppression removes all of the bounding boxes other than the ones that are the most approximate in order to get the optimum bounding box for the item that has been supplied. Because of the non-max suppression, an extra measure for determining the objectiveness of an item is offered.

4. CHARACTER RECOGNITION:

It is possible to determine the form of the license plate by using the KNN approach. The outlines are segmented based on their sizes by using this method. Pythagorean theorem may be used to calculate lengths, and elementary trigonometry can be used to get angles. This allows us to identify the connections between the letters. Following this, we will continue to transform the photo of the license plate to a grayscale version. After that, eradicate the fake responses that were given. The next step is to apply a threshold that is twice as high in order to locate the appropriate edges. Tracing the contours comes after the identification of the edges. These characters are in a position to identify the labels that are seen on the license plates.

RESULTS

Fig 3: The Number Plate Detection with the Objective Score.

Fig 4. Plate Detection and Character Recognition of the Number Plate of A vehicle.

DISCUSSION

The first thing that has to be done in order to complete the program is to open the required document and model. If you want to run the code, you may either use Visual Studio or the command prompt. in order to continue, you are need to make a copy of the path to the folder that contains the required documents. Please follow these procedures in order to execute the code at the command prompt: Take, for instance, the C:\Users\BQIN\Desktop directory.A module known as Yolov4-custom-functions is responsible for identifying license plates. To run the code, you must first ensure that the required packages are installed, and then you must paste the path into the command line. The optical character recognition (OCR) process should be performed on a license plate once it has been identified successfully. Over there, in Figure 2, you can see the final result.

CONCLUSION

As was indicated before, the configuration in question is more analogous to a base upon which ANPR systems may be built. Morphological operations, picture gradients, thresholding, bitwise operations, and contours are

some of the core approaches that are used in computer vision and image processing in order to find a license plate inside a photograph. It is only in predictable and controlled environments that the techniques will be successful; for instance, when all of the input images have the same lighting and license plates have the same format (for instance, black lettering on a white background). It is essential, however, to replace certain components—specifically, character segmentation, license plate localization, and character optical character recognition—with more advanced machine learning and deep learning models in order to construct a system that is capable of functioning in environments that are not under human control. The ANPR station is traversed by hundreds of thousands of cars on a daily basis, which presents a number of challenges for the operation.

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