Report On

License Plate Recognition System

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Subject: Data Science

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Acknowledgment

I would like to express my special thanks of gratitude to Herald College for organizing summer class. Similarly, I would like to thank our module leader Sunil Ghimire as well as our GTA Dinesh Saud for giving me golden opportunity to do this wonderful project of AI. It helped me increase my knowledge and skills

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1. Finding a research topic

The prime objective of this system is to identify number plates and detect it on written format. I had chosen this topic because in Nepal seven people die every day in road accidents. The most of them occur due to over speeding. With the rise in the number of automobiles, it has become increasingly challenging to track them and almost impossible to identify the owners of these vehicles in case of violation of any traffic law. This has led to increase in traffic congestion, and with it comes traffic problems. This has led to the need to develop a system that can tackle these issues. So, License Plate Recognition System helps to monitor the vehicle average speed. The aim is to design an efficient automatic vehicle identification system by using the vehicle number plate.

The main objective of this system is to manage and monitor all vehicle more effectively. It also helps to make transport sector efficient. Likewise, transparent data collected by these systems enables efficient management of lane vehicle control such as carpooling, tolling, and public transit system schedules. It enables opportunities to generate congestion pricing revenue and dynamically manage vehicle.

The developed system first detects the license number by taking frame by frame input and recognize the character by using Optical Character Recognition (OCR) and then Character recognition technique is used for the character extraction from the plate. The system is implemented and simulated in python, and its performance is tested on real image. I used OpenCV to read and visual image in python. OpenCV is an open-source computer vision library. The library has more than 2500 optimized algorithms. These algorithms are often used to search and recognize faces, identify objects, recognize scenery, and generate markers to overlay images using augmented reality. Likewise, I use Tesseract to read and recognize the text in images. It is also useful as a stand-alone invocation script to tesseract, as it can read all image types supported by the Pillow

2.Professional Activities

The primary goal is to recognize license plates. The artificial intelligence plate card detection system is an image processing technique that utilizes a number (license) plate to identify the vehicle and then extracts the information of that License Plate. The goal is to create an effective automatic vehicle identification system utilizing the car license plate. The created system identifies the license number by capturing frame-by- frame input, recognizes the character with Optical Character Recognition (OCR). For character extraction from the plate, a character recognition approach is utilized. ANPR is also useful for the police, who can browse the data collected and check for suspicious vehicles, or vehicles that were involved in a crime. Historically, number plate recording would take time, and then longer still to send out penalty notices to those who violate traffic laws. With ANPR however, number plates can be recognized and checked against the database instantaneously. ANPR is also useful for the police, who can browse the data collected and check for suspicious vehicles, or vehicles that were involved in a crime. Historically, number plate recording would take time, and then longer still to send out penalty notices to those who violate traffic laws. With ANPR however, number plates can be recognized and checked against the database almost instantaneously.

The current problem involves identifying fast-moving vehicles by their plate number. It can be extremely hard to capture the image of moving vehicles in real time in such a way that the vehicle plate number is detected. Shapes of the vehicles have a key role in recognition, there's high intra-class variance among vehicles. It creates the possibilities for miss recognition. Also because of poor lighting and low contrast the system couldn't detect the number plate. There is the concern that storing information could lead to data leaks and theft, or misuse of their personal information.

To tackle the above problem, we can capture the fast-moving vehicle by using novel algorithm, which convert video into image frames. Then Number plate extraction of vehicle by using several geometrical features. Finally removing the blur from the vehicle number plate by using blind image DE convolution. This Experiment results show that this method can improve the efficiency of the moving vehicles number plate detection without blur greatly (Vikas, 2014).

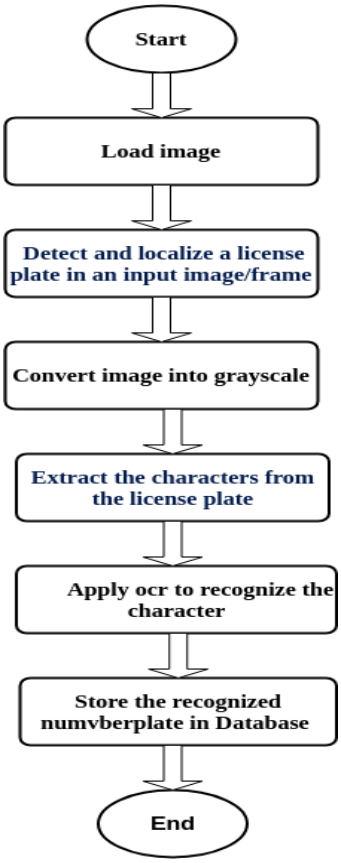

Figure 1 Flowchart

3. Literature Review

License Plate Recognition (LPR) is an automatic computer vision technology which helps to identify vehicles using their license plate number. From applications at parking lot management to traffic flow monitoring; license plate recognition system can also be useful to identify the stolen vehicles. (Tushar Goel1, 2020) For this, we use Optimal Character Recognition. By using optimal character recognition machines can recognize the text in the images provided to them as input automatically. We will be using tesseract 4 recognizing the digits in the number plate. tesseract is an optimal character recognition engine which has support for various languages and is open source. Firstly, an image is given as an input which is converted into binary image which is then pushed for component analysis use to extract character outlines. The outlines after being converted into blobs are organized into text lines and are divided into words using spaces. The recognition off the text is done in two pass process which recognizes the text (Dr. Atul Patel, 2012). A significant amount of work has been done over the last couple of years on image processing technique and deep learning for object detection purpose. Several different recognition and detection algorithms for vehicle reconnaissance have evolved in this field. We can see different current techniques occurring from literature review. Literature Survey For the past several years, there has been an increasing interest among researchers in the problem related to extracting text from video. Intensive research has been carried out in this area, which is evident from large number of technical papers.

Zoe Jeffrey, Xiao Jun Zhao et al., have proposed a method of Automatic number plate recognition system based on ARMDSP the arithmetic capability of digital signal processors (DSPs), the multiple peripheral interfaces and the high frequency execution of the ARM processors make them an attractive choice for real time embedded systems (Sharma2, 2017).

Nanmus Saiph et. al (2019) have proposed a system to detect and recognize the Bangla license plate from the vehicle picture by using the convolutional neural networks. In this work, focus to choose convolution neural network in the designed system is preferred because of its configuration for the end-to-end pipeline. CNN clearly outperformed conventional image processing algorithms for their case and compared generalized CNN models better in different scenarios. The detection research was done using YOLOv3 which consists of 53 convolutional model layers. The second stage after identification is image

segmentation and recognition of the characters it is. During this step, the device whips out the number plate region and then moves it to the second YOLO model for segmentation and platform image recognition. As a result, the model was checked with 200 images and correctly recognized the license plate number for 199 images that 99.5 percent accuracy rate (Shally Gupta*, 2020)

Prasenjit Dhar et. al (2018) developed an automated LPR program to support ITS for the identification of Bangladeshi license plates. This work plate shows clearly white background with black fonts. Prewitt operators performed the detection of the number plate to segment the edges. Morphological dilation was performed to accentuate the points. Eventually, deep CNN was used to accomplish the reconnaissance job. In character classification, the protocol showed a strong precision rate of 99.6 percent Cheng-Hung Lin et. al (2019) proposed a three-stage license plate recognition system based on Mask-RCNN which was used for various shooting angles and numerous oblique images. The author used YOLOv2 for the associated conveyance in the preceding stage for vehicle detection. Next stage was the location of the license plate where YOLOv2 was again performed to detect number plate. During this phase, YOLOv2 separates the images of phase I captured vehicles into 19 x 19 grids. In the final step, the author used Mask R-CNN for character recognition. The result in this work depicts that the proposed model could classify vehicle number plates including bevel angles above 0-60 degrees and further accomplished the map rating of around 91 percent (Shally Gupta*, 2020).

Kul Deepak et al. In this paper [1] they introduced that high level of precision has been required by the number plate recognition when streets are occupied, and number of vehicles are passing through. In this paper, by optimizing different parameters, they have accomplished an exactness of 98%. It is essential that for the tracking stolen vehicles and monitoring of vehicles of an exactness of 100% can't be bargained with. Therefore, to accomplish better precision streamlining is required. Additionally, the issues like stains, blurred regions, smudges with various text style and sizes ought to be remembered. This work can be further boundless to minimize the errors because of them. (goyal1, 2016)

4. Refection of Research Project

As a beginner to AI, this project was ideal for a start-up. I learned about a variety of factors that are required for python and machine learning. During the system's development, I confronted a variety of challenges, including system errors and time management issues. But, with time, I was able to manage them. It took me a lot of hour to figure out the error. I had gone through numerous websites and YouTube videos that really helped in the completion of my system. And the result was well worth the effort.

I had acquired a knowledge that will certainly benefit me in the future. I learnt valuable life lessons about time management and how to deal with errors. During the project, I procrastinated a lot and had to deal with the consequences. It was difficult to keep track of time because I procrastinate a lot. I had a limited amount of time, so I had to accomplish a lot of research, train a model and so on. However, this has improved my time management abilities and enhanced my research skills which would be benefit in my future.

If I am given the opportunity to work on a similar project in the coming days, I will first design a Gantt chart to arrange my schedule and work appropriately. Second, I would not procrastinate and would carefully manage my time. Since it was my first AI project, I believe the system was inadequate for all kind of image. So, next time, I'll make a better appropriate system that will result in a more efficient output.

References

Dr. Atul Patel, C. I. (2012). Optical Character Recognition by Open-source OCR Tool Tesseract: A Case Study. *research gate*.

goyal1, A. (2016). Automated Car Number Plate Detection System to detect far. *IOSR Journal of Computer Engineering*, 40.

Shally Gupta*, R. S. (2020). A Review Paper on License Plate Recognition System. *iMedPubJournals*.

Sharma2, R. K. (2017). Review on Automatic Number Plate. *International Journal of Advance Engineering and Research*, 50.

Tushar Goel1, D. K. (2020). SINGLE LINE LICENSE PLATE DETECTION USING OPENCV AND. *International Research Journal of Engineering and Technology (IRJET)* , 5887.

Vikas, C. (2014). *Fast Moving Vehicle Number Plate Detection.* Paiyanoor-603 104, Tamil Nadu, India: International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering.