

Python Automated Tool to Detect over Speeding of a Vehicle through ANPR Technology

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Abstract: Every country now has a serious issue with traffic regulation and vehicle ownership identification. It might be challenging to recognize car owners who drive excessively fast and against road regulations. As a result, it is impossible to apprehend and penalize those individuals since traffic officials may not be able to obtain the vehicle's license plate from a moving vehicle due to its speed. As one of the answers to this problem, it is necessary to design an automatic number plate recognition system. We will create a web application that performs the task to identify the number plate and display them. To accomplish the system models of Machine Learning (like K-means or CNN), EasyOCR, and OpenCV will be implemented. We will be using the YOLO dataset to train the model that is used to identify the detect the license plates

Keywords: Machine Learning

I. INTRODUCTION

Automatic Vehicle number-plate recognition (ANPR) is a technology that uses optical character recognition on images to read vehicle registration plates to create vehicle location data. It can use existing closed-circuit television, road-rule enforcement cameras, or cameras specifically designed for the task. Police departments all over the world use ANPR to enforce the law, including determining whether 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 highway agencies. Automatic Vehicle number-plate recognition can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the driver. ANPR technology must account for plate variations from location to location. Systems frequently use infrared lighting to enable the camera to take the picture at any time of day or night.

To help the road safety department we are implementing the project to automatically detect the vehicle number plates for a moving vehicle. The detected number plates will stored for the further reference.

II. LITERATURE REVIEW

1. Vanshika Rai and DeepaliKamthania Automatic Number Plate Recognition, ICICC 2021.

In this paper, the author has attempt to develop an automatic number plate detection and recognition system for Indian vehicles. The proposed system first detects the vehicle and then captures the vehicle image. Vehicle number plate region is extracted using image segmentation and characters are recognized using the optical character recognition technique. The system can be low-illuminated, cross-angled, nonstandard font number plates. The morphological transformation, Gaussian smoothing, and Gaussian thresholding the different image processing techniques have been used in the pre-processing stage. The contours have been applied by border following and contours are filtered based on character dimensions and spatial localization for number plate segmentation then for character recognition, the K-nearest neighbor algorithm has been used

2. C Gurvav, Vedika .k, Rupali .G, A Review Paper on Vehicle Number Plate Recognition, 2019 IJERT.

In this paper for detecting the image an OCR technique is used, which converts the image to text and the text is displayed on the screen of the computer. When the number plate detected contains the correct number of vehicles then only the gate is opened otherwise the gate will not open. The author tells that in the future, cloud computing can be used which can be useful detect and store the information permanently. thus concluded that Open CV gives the best

result in vehicle plate detection consisting more of function in computer vision than Matlab. For the recognition, the author has preferred tesseract OCR(Optical Character Recognition) for better results.

3.S. Babbar, S. Kesarwani, N. Dewan, K. Shangle and S. Patel, "A New Approach for Vehicle Number Plate Detection," 2018 Eleventh International Conference on Contemporary Computing (IC3), 2018, pp. 1-6, doi: 10.1109/IC3.2018.8530600.

The author proposes the technique "Threshold Modification" which proved to be successful for detecting number plates even in low light conditions, and extreme brightness which otherwise failed in previous machine learning systems. Various OCR techniques such as LR+RF, SVC+KNN, Extra Trees, and SVC (Linear, Poly, Rbf, Linear. svc) have been applied and compared, with SVC (Linear) giving the best accuracy segmented characters correctly recognized. on is only expected in low light or bright(sunny) conditions. The system is also successful in detecting number plates from skewed angles. The author conveys that there is a need to expand the types of vehicles that can be detected: trucks, buses, scooters, and bikes.

4.A. Sasi, S. Sharma and A. N. Cheeran, "Automatic car number plate recognition," 2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIECS), 2017, pp. 1-6, doi: 10.1109/ICIECS.2017.8275893.

This paper proposes an intelligent approach to detecting vehicular number plates automatically using three efficient algorithms namely Ant colony optimization (ACO) used in plate localization for identifying the edges, a character segmentation and extraction algorithm, and a hierarchical combined classification method based on inductive learning and SVM for individual character recognition. In this paper, modifications like assigning a well-defined initial ant position and making use of weights to calculate a heuristic value which will provide additional information about transition probabilities are used to overcome the limitations. Further, a character extraction and segmentation algorithm which uses the concept of the Kohonen neural network to identify the position and dimensions of characters is presented along with a comparison with the existing Histogram and Connected Pixels approach.

5.M. Atikuzzaman, M. Asaduzzaman and M. Z. Islam, "Vehicle Number Plate Detection and Categorization Using CNNs," 2019 International Conference on Sustainable Technologies for Industry 4.0 (STI), 2019, pp. 1-5, doi: 10.1109/STI47673.2019.9068049.

Authors have presented a cascaded combination with the CNN model for a Class Letter recognition system that minimizes the computation time while achieving a high accuracy rate. Due to having features extracting deep learning capabilities, CNN performs far better than traditional neural networks. The model is used to develop a Vehicle class letter recognition system that operates only with the information presented on a License Plate, which takes only videos as input. Authors have only used Gray normalized images to train and test the CNN classifier. Finally, author concludes that a large and complex CNN model with the GPU system surely will progress the total performance of the system.

6.N. P. Ap, T. Vigneshwaran, M. S. Arappadnan and R. Madhanraj, "Automatic Number Plate Detection in Vehicles using Faster R-CNN," 2020 International Conference on System, Computation, Automation and Networking (ICSCAN), 2020, pp. 1-6, doi: 10.1109/ICSCAN49426.2020.9262400.

The paper is aimed to identify the number plate in vehicles during difficult situations like distorted, high/low light, and dusty situations. The paper proposes the use of the Faster R-CNN to detect the number plate in the vehicle from the surveillance camera which is placed on the traffic areas etc. The created system is used to capture the video of the vehicle and then detect the number plate from the video using frame segmentation and image interpolation for better results. From the resulting image using the technique called optical character recognition is applied to that image for number recognition. These numbers are given as input to the database to retrieve data like the vehicle's name, owner name, address, owner mobile number, etc. The performance of this system is measured using a graph model.

7.A. Kashyap, B. Suresh, A. Patil, S. Sharma and A. Jaiswal, "Automatic Number Plate Recognition," 2018 International Conference on Advances in Computing, Communication Control and Networking (ICACCCN), 2018, pp. 838-843, doi: 10.1109/ICACCCN.2018.8748287.

The algorithm proposed by the author for the no Plate recognition has been seen through. Because of the unavailability of such an ANPR gadget off the shelf in tune with our requirements, it's far an endeavor to personalize an ANPR system for instructional institutions. Template match becomes used on quantity plates acquired from static photos and an average Accuracy of 82.6% has been obtained. The accuracy of each character has been shown. This accuracy can be advanced significantly by way of putting the digicam definitely to capture the perfect body. Image processing concept is used in this Number Plate Recognition system. OCR scheme is also applied in this for reading the image of the vehicle number plate by the author.

8.J M S V Ravi Kumar , B Sujatha and N Leelavathi, "Automatic Vehicle Number Plate Recognition System Using Machine Learning", 2021, doi:10.1088/1757-899X/1074/1/012012.

The main objective of the author in this paper is to use and combine different morphological operations in such a way that the license plate of a certain vehicle can be detected and translated effectively. This is based on various operations such as image improvement, Grayscale transformation, Bilateral Filtering edge detection, and getting the number plate from the picture of the vehicle. After the completion of the above-mentioned steps, the author has processed segmentation and applied it to detect the text present on the number plate by making use of matching of the template and OCR. This system was able to detect the license number accurately as well as quickly from the vehicle's picture.

9.Divya Rastogi, Mohammad Shahbaz Khan, Kanav Jindal, Karan Singh, "A Real-Time Vehicle Number Plate Detection and Recognition System", Journal of Xi'an University of Architecture & Technology, 2020.

In this paper, the authors have attempted to recognize the number plates of vehicles. The initial results obtained from this study are very encouraging, even with a very small amount of training samples. Real-time vehicle number plate recognition (RVNR) system is used for the detection of number plates on vehicles and for recognizing the characters from the number plates. The advantage of the author's proposed method is its high accuracy in plate detection and recognition..

10.Ravi Kiran Varma Pa, SrikanthGantaa , Hari Krishna Bb , Praveen "A Novel Method for Indian Vehicle Registration Number Plate Detection and Recognition using Image Processing Techniques", International Conference on Computational Intelligence and Data Science, 2019.

In this paper, the author presents a novel image processing system for Indian number plate detection and recognition that can deal with, noisy, low-illuminated, cross-angled, non-standard font number plates. This work employs several image-processing techniques such as morphological transformation, Gaussian smoothing, and Gaussian thresholding in the pre-processing stage. For number plate segmentation, contours are applied by border following and contours are filtered based on character dimensions and spatial localization. Finally, after the region of interest the author filters, and de-skewing, and the K-nearest neighbor algorithm is used for character recognition. The proposed method by the author demonstrated promising results.

III. EXISTING SYSTEM

Automatic Number Plate Recognition (ANPR) System: ANPR is a popular system that uses machine learning algorithms to automatically detect and recognize number plates of vehicles in real-time. The system is used in traffic enforcement, toll collection, and parking management. ANPR systems use optical character recognition (OCR) techniques to extract the number plate characters, and then use machine learning algorithms to classify the characters and recognize the number plate. **Speed Detection System:** Speed detection systems use machine learning algorithms to detect the speed of vehicles. These systems use cameras to capture images of vehicles and then analyze the images to determine the speed of the vehicles. Machine learning algorithms are used to extract features from the images and then predict the speed of the vehicles based on these features. These systems are used in traffic management, road safety, and law enforcement. **Combined ANPR and Speed Detection System:** There are also systems that combine ANPR and

speed detection capabilities. These systems use cameras to capture images of vehicles and then use machine learning algorithms to recognize the number plate and determine the speed of the vehicle. These systems are used in traffic enforcement, toll collection, and parking management.

IV. PROPOSED SYSTEM

Proposed systems to detect number plate and speed of vehicles using machine learning may involve using more advanced algorithms such as deep learning and convolutional neural networks (CNNs). These algorithms have shown promising results in object detection and recognition tasks, and can potentially improve the accuracy and efficiency of the systems. However, developing and implementing these systems may require significant computational resources and expertise in machine learning and computer vision

V. OBJECTIVES

- To develop a website that uses video or can access the webcam for input.
- To create a system that identifies the number plates.
- To display/store the identified number plate data.

VI. METHODOLOGY

Data Collection:

Collect video data of vehicles passing through the targeted area. This can be achieved by installing CCTV cameras or other similar video surveillance systems.

Data Pre-processing:

Pre-process the collected video data to extract individual frames from the videos. This step will involve filtering out unnecessary frames and retaining only the relevant frames containing vehicles.

Vehicle Detection:

Use object detection algorithms, such as YOLO, to detect the presence of vehicles in each frame.

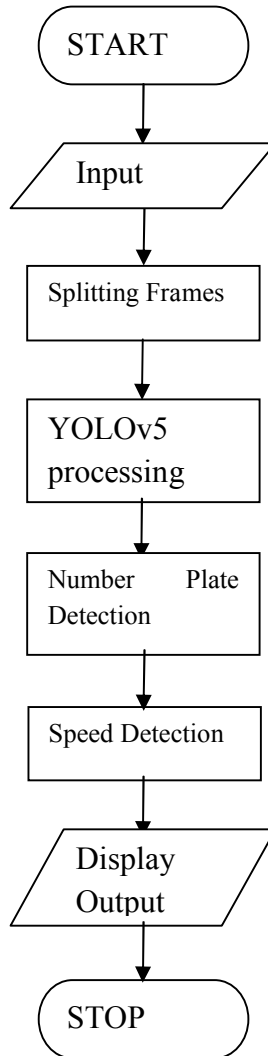
Speed Detection:

Calculate the speed of the vehicles by analyzing the position of the vehicles in the video frames over time. This step can be achieved by using optical flow algorithms or other suitable methods.

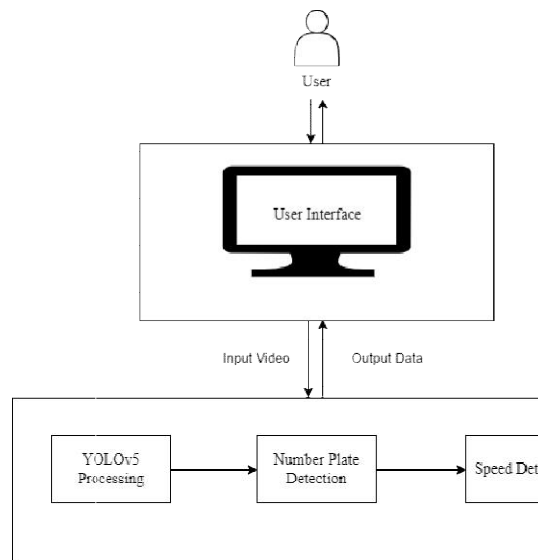
Number Plate Detection:

Use optical character recognition (OCR) techniques to detect and extract the number plate from each vehicle detected in the video frames.

Flow Chart:



System Architecture:-



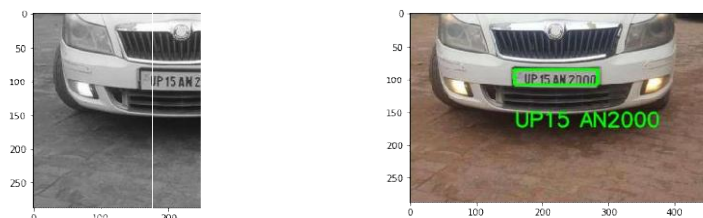
VII. PROBLEM STATEMENT

Identifying the number plates of the vehicle automatically that brake the traffic rules like crossing the speed limit.

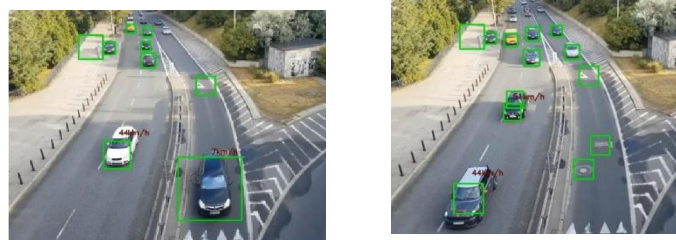
VIII. EXPECTED OUTPUT

Convert the input image into grayscale format will also help the image binarization (using python numpy) later. Binarization is the process of applying a threshold value to change the grey to the binary value which contain only 0 or 1. The edge detection of the number plate from the entire image can be performed or used by the Sobel mask. Sobel mask is commonly used for edge detection in image processing. It defines all the edges in the input image. After cropping the license plate, the next step is character segmentation. Character segmentation is to separate the alphanumeric character on the license plate individually.

Thus, the characters are needed to be transformed to an array of numerical data. It can be achieved by using the Vertical Projection Profile (VPP). VPP is to determine the brightest color and also the darkest which match the normal color of a number plate. In this way, the computer can know the gap between each character and separate accordingly.



In this figure showing user input vehicle image and convert into number plate Recognition with plate



Show speed of Vertical in this figure

IX. CONCLUSION

The built model will be able to detect the number plates of the moving vehicles and display the ones that cross the speed limit. The performance of the models will be measured using the accuracy score of the model. The best predicting model will be finally integrated with an interface to display the recognized number plates that cross the speed limit.

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