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Image Segmentation based Imperative Feature Subset Model for Detection of Vehicle Number Plate using K Nearest Neighbor Model

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Abstract

The vehicle's license plate number can be read by an image recognition system, called number plate recognition. The goal is to implement a license plate-based modified authorized vehicle recognized verification system that works smoothly. The system can be implemented at the entry point for controlling access to a highly restricted area, such as a military base or the area around the most important government buildings (such as the Parliament or the Supreme Court). The built system first identifies the car, and then takes a picture of it. The license plate area of the vehicle is then converted to grayscale. At that time, the license plate is taken off the car. After that, a KNN (K-Nearest Neighbors) algorithm is used to identify the numerical and alphabetic sequences. With this information, the vehicle's owner, preferred location, current residence, etc. are tracked. Python is used for the implementation, and the system is tested with real images. The test results show that the proposed framework successfully differentiates between fake and real images of license plates. The purpose of this extension is to develop an illustration capable of correctly selecting a license plate based on a photograph of the plate.

Keywords- Image Segmentation, Feature Subset, Vehicle Number Plate Recognition, Image Processing, Optical Character Recognition, K Nearest Neighbor.

1.INTRODUCTION

One possible framework for widespread surveillance is "Detection of Number Plate," which takes pictures of automobiles and reads off their license numbers. Computerized activity observation and tracking systems, computerized highway/parking toll collection systems, computerization of gas stations, and travel time monitoring are just some of the many uses for a Detection of Number Plate system [13]. Such systems automate the previously labor-intensive task of VIN recognition, making it quick, easy, and cheap to do. Vehicles have been transformed into conceptual assets within the realm of information innovations as a result of the massive combination of computer program items, beneath various perspectives of our modern world [14]. Without data, there is no point in having data applications, hence it is imperative that the vehicle data be redesigned across all data frameworks.

Experts on the outside can do it in person [15], and there's also a clever systemthat can read license plates and identify automobiles in real time. Amongst clever hardware, the structure of identifiable proof of vehicle number plates is already established [16]. This demonstration of vehicle number plate identification and affirmation is used to recognize the number plates and then make the location of the plate, which is to induce the genuine content from the picture and by using the modules of calculation, which make use of area calculations, division plate and personality recognizable proof. Parking lot utilization, electronic toll payment, vehicle diversity on the road, and congestion hotspots are all common applications.

The Number Plate Recognition framework [17] is able to decipher the characters on a license plate by employing a plethora of techniques and algorithms, such as image pre-processing, objection discovery, character division, and acknowledgement. Included are a camera for identifying the license plate in issue and a processing unit for reading it, extracting the characters, and converting the pixels into readable numbers [18]. There have been numerous applications of the Detection of Number Plate framework, including but not limited to the authorizing of activity, counting speed camera, activity light camera, discovering stolen vehicles, and checking at borders. In addition, it can be put to use in other facets of building management, such as parking management and access control. A different angle is taken on the problem via machine learning. The idea is to gather a large corpus of license plates to use as "training data," and then design a system that can make progress based on what it sees in the training examples. Machine learning uses the images to deduce rules for number plate recognition. In addition, the system can improve its accuracy by learning more about numbers and characters, which can be accomplished by increasing the amount of training samples.

As the number of terrorist attacks rises, it is widely believed that number plate detection will become an increasingly vital part of security initiatives around the globe. Three distinct operations make up the Number Plate Detection algorithm:

Detected License Plates

Character recognition and character segmentation

Character segmentation and character identification are crucial to achieving precise plate extraction. If the characters are not fractured properly, recognition accuracy will suffer significantly. Misrecognition of characters is a direct outcome of improper character division.

2. LITERATURE SURVEY

The initial step of this article is to record footage of the license plate using a video camera. The second stage is to transform the video into individual still images. In the next crucial step, frames are transformed into Images [5]. After that, pictures of license plates are saved in a database for use in determining who has broken the law. A notification to pay the fine will be forwarded to the appropriate parties automatically. Automatic License/Number Plate Detection/Recognition (ANPR) is a technique proposed by S. Kranthi and K. Pranathiin to detect a vehicle's license plate number from an image. Presenting automobiles believed to be involved in criminal activity or that have been stolen is one application of automatic number plate recognition [7].

Shehata, Du, and Badawy [7] Outline a systematic analysis of current ALPR techniques, classifying them in terms of the attributes employed at each stage. We compared their benefits, drawbacks, recognition rates, and processing times. Finally, a look into the future of ALPR was provided. Multi-style plate recognition, video-based ALPR with temporal information, multi-plates processing, elevated plate image processing, and ambiguous-character identification are all promising areas for future ALPR study.

This article [6] demonstrates the efficacy of the Otsu approach with the K-nearest neighbour technique (KNN). The Otsu method is used to extract features from an RGB image and convert it to a binary format. In order to classify data, scientists employ KNN, an algorithm that is resistant to background noise. Pixels can be converted into binary with the use of feature extraction, a technique used in pattern recognition. Otsu technique is used for feature extraction, and KNN classifies by comparing test data from the same neighbourhoods as the training data. Using a learning algorithm, we find our test data, and then we classify it. The Otsu technique employs a binary vector independent of the threshold value, and is based on a pattern recognition algorithm. Image pixel value distribution is tweaked to improve results of binary segmentation. In this research, KNN classification was found to be quite helpful for auto plate recognition.

Using a supervised machine learning method called K-means, this paper [8] separates the characters into subgroups for further classification by a tool called Support Vector Machine (SVM), which can read even blurry license plate photos. Character identification challenges caused by camera tilt, vehicle speed, and ambient light and shadow will be easily distinguished with this technique. The images captured by the camera are too dim to be read. SVM is widely used for regression and classification due to its high accuracy and top-notch performance. Samples from many classes must be classified by multi-classification SVM classifiers. The effort of SVM classifiers is increased by the

large amount of samples, reducing its accuracy. Using supervised K-means, even obscure characters can be sorted with relative ease. The SVM is then used to categorize the make-up of subgroups, attenuating the number of character classes and the complexity of the resulting SVMs.

This paper [8] investigates the KNN technique for categorizing license plate data. The photos of passing automobiles are processed by an image processing camera mounted on the highway. After number plates have been segmented from detected contours, the contours within the plates are computed as though they were valid characters, including the size of each individual character. The KNN algorithm is used to assign a category to each contour. In order to train the KNN algorithm, a new collection of data is used, and this new set of data has 36 characters total, including 26 alphabetic characters and 10 numeric characters. Characters that have already been segmented are used to evaluate the algorithm and it is compared to other character recognition methods such as artificial neural networks.

This article [9] Demonstrates the use of a method for reading the characters of a license plate and uploading the relevant information to a server. Obstacles encountered include a lack of clarity in the image. Next, the license plate is isolated from the rest of the data. As a result of this procedure, we are able to partition the characters on a license plate and use KNN to extract them. After that, putting the same information online.

The authors are S. Roy, A. Choudhury, and J. Mukherjee. [10] The authors proposed a mechanism to localize license plates, mostly for automobiles in West Bengal (India), and split the numbers up so that each one could be uniquely identified. A method is presented in this study that makes use of the sobel edge detection method and a few more straightforward morphological operations. He also provides a straightforward method for decoding the license plate's alphabetic and numeric characters. Following successful noise reduction in the input image, we employ histogram equalization to boost contrast in the resulting binarized image. First, we look for the license plate, and then we break down the individual digits and letters so that we can read them.

3. EXISTING SYSTEM

The current method for figuring out a car's specifics is labor-intensive and prone to mistakes made by humans. Here's an example of a traffic fine e-challan issued by the appropriate authorities: The traffic is being recorded in real-time by a CCTV camera. It is possible that CCTV will show drivers who have broken the law. The police will examine the CCTV tape in hopes of identifying the license plate number, and the incident will be recorded. It takes a lot of people to complete this task.

Some problems with the current model are as follows:

The existing models require more people, cost, time, dependence but they deliver only less performance.

4. PROPOSED SYSTEM

We present a computerized and robotic license and number plate identification system that uses image processing techniques to automatically identify and catalogue the plates of cars moving through a specified area. The suggested framework does not necessitate the introduction of any new hardware, such as a global positioning system (GPS) or radio frequency recognized evidence. The framework uses specialized cameras to take photographs of each passing car, which are then sent to a computer to be processed by the Detection of Number Plate software. The algorithms used by the software used for plate recognition include localization, orientation, normalization, division, and finally optical character recognition (OCR). The forthcoming information is linked to the database records for comparison. The results of the evaluation show that the proposed framework is able to accurately detect and recognize the license plate of a car in real-world photos. Security and monitoring of actions can also make use of this architecture. This structure can also be used to identify cars that have been reported stolen. There is no need to install any specialized hardware in vehicles to make use of this framework. These cameras capture raw data, which is then processed in a computer. The framework database keeps track of all vehicle traffic data indefinitely. Thus, unique parking doors at various times can be used to reconstruct point-by-point activity details.

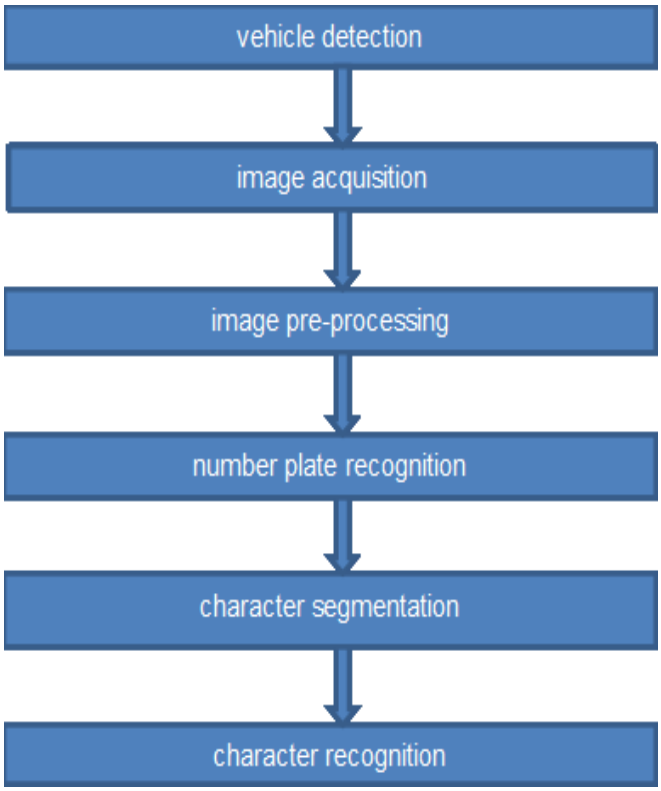

Fig 1: Flowchart for Proposed System

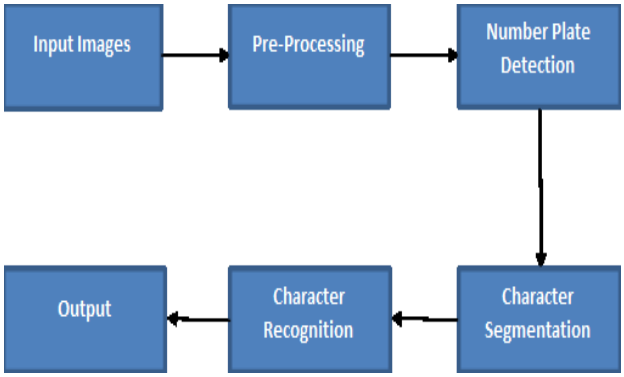

Fig 2: Detection of Number Plate

5. RESULT

In the graphic below, we see python being trained to recognize license plates. To get the results shown below, I ran a Python program that does the heavy lifting of training the model using the dataset and saving the model using several modules available in Python. After a test image that wasn't part of the training dataset is passed through the indicator file and recognized, the license plate range is highlighted in red for much clearer visibility of detection. The photo will initially be taken with a camera. Following image capture, the system will convert the image to grayscale, extract potential license plates, and finally recognize the vehicle's registration number. Final registration details are retrieved from the database and shown on the screen.

Fig 3: Image taken using USB camera

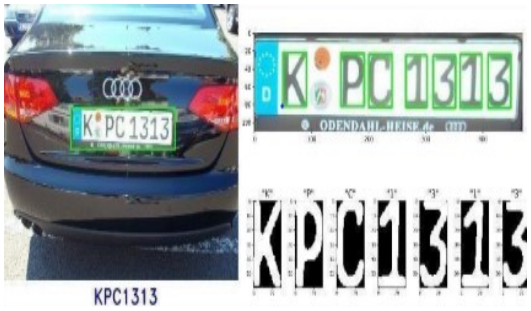

Fig 4: ROI Detection Number plate

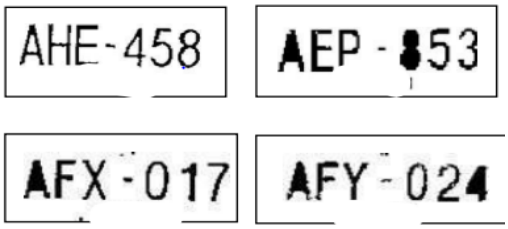

Fig 5: Vehicle Number Plate Extracted

Fig 6: Binary image

Fig7: Line separation using row segmentation

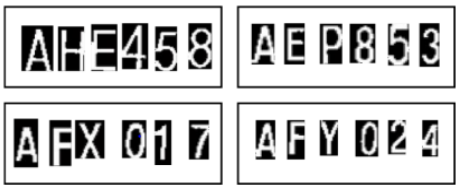

Fig 8: Character segmentation using column segmentation

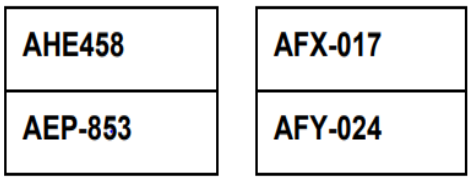

Fig 9: Recognize character using OCR

The feature extraction time level will be low when compared to the existing model. The feature extraction time level graph for proposed and existing system is represented as follows:

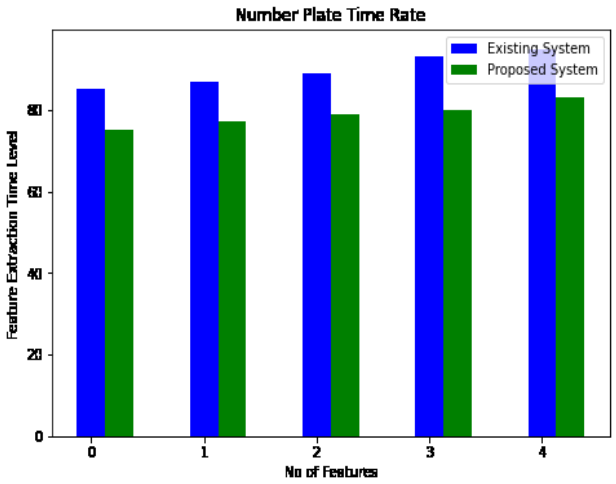

Fig 10: Feature extraction time level

Feature extraction accuracy level is high when compared to existing model. Feature extraction accuracy level for proposed and existing model is represent as follows:

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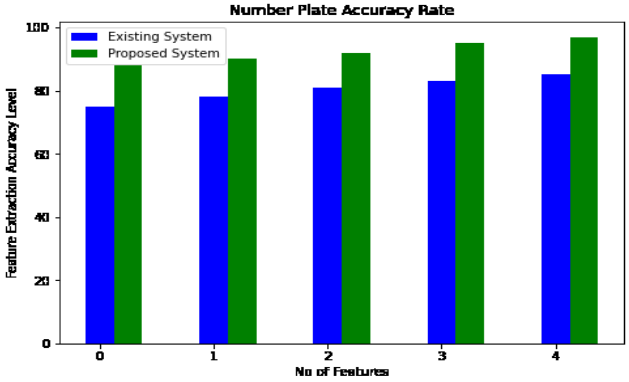

Fig11: Feature extraction accuracy level

The feature selection time level is less when compared to existing model. The feature selection time level graph for proposed and existing model is represented as follows:

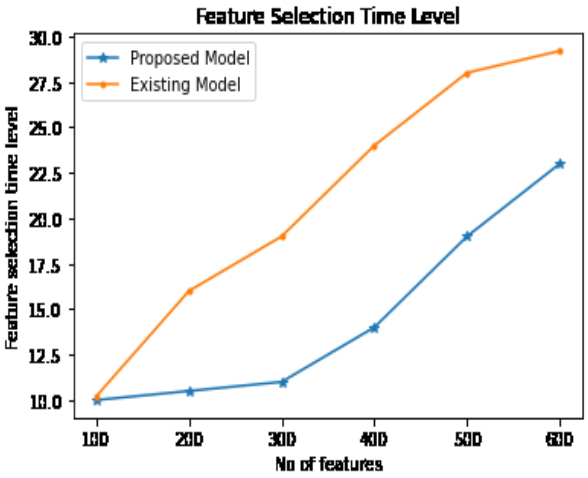

Fig12: Feature selection time level

Feature selection accuracy level is high when compared to existing model. Feature selection accuracy level graph for proposed and existing model is represented as follows:

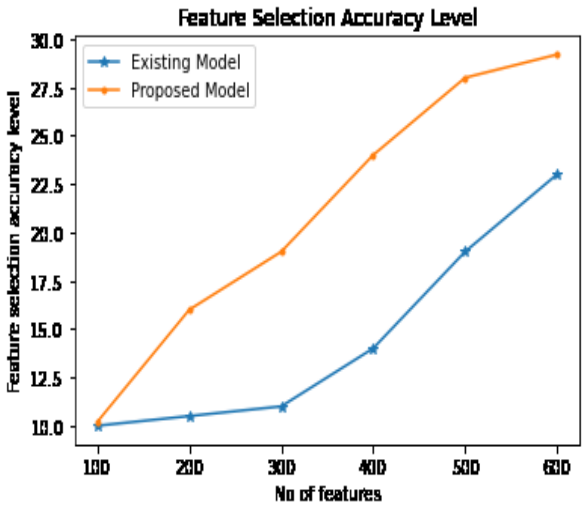

Fig13: Feature selection accuracy level

6. CONCLUSION

For license plate recognition, machine learning algorithms like KNN perform well. It includes the results of an examination of the results based on several characteristics, such as the proportion of success in recognizing a certain set of characters from a large collection of characters and numbers. Based on the data shown above, we can infer that the quality of the camera used to examine the plate will greatly improve the effectiveness of number plate detection. Using a low-resolution camera will degrade the production value and could lead to inaccurate character identification. Many tasks that require uniquely identifying a car by its license plate number can benefit from this software. Currently, the application is fully functional for use in modest settings, such as a parking lot or a traffic line. Soon, we'll be able to link up the whole system with a criminal database and use facial recognition to identify fleeing criminals. This study demonstrates several unique approaches to detect and recognize different types of license plates.

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