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Number Plate Recognition using Machine Learning

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Abstract - Number plate recognition is an image processing technology which uses number (license) plate to identify the vehicle. The objective is to design an efficient automatic authorized vehicle identification system by using the vehicle number plate. The system can be implemented on the entrance for security control of a highly restricted area like military zones or area around top government offices e.g. Parliament, Supreme Court etc. The developed system first detects the vehicle and then captures the vehicle image. Vehicle number plate region is then converted into grayscale. The number plate is then extracted. Then, using KNN (K- Nearest Neighbours) algorithm is used to recognize the digits and the alphabets. This data can be used to find vehicle's owner, place of registration, address, etc. The system is implemented using Python, and its performance is tested on real images. It is observed from the experiment that the developed system successfully detects and recognize the vehicle number plate on real images.

KEYWORDS: Image Processing; grayscale; KNN; Automatic Number Plate Recognition System; e-challan

I. INTRODUCTION

Due to the increasing number of vehicles nowadays, the modern city needs to establish the effective and efficient automatic traffic system for the management of the traffic law enforcement. Number plate recognition leads the significant role in this condition. The number plate recognition is an image processing technique to extract the image of license plate on vehicle taken by digital camera or taken by either a colour or a grayscale digital camera, as well as an infrared camera in order to identify the vehicles using their number plate.

The Number Plate Recognition system recognizes characters on license plate through the combination of various techniques and algorithms, including image pre-processing, object detection, character segmentation and recognition. It consists of a camera to detect the number plate object and processing unit to process and extract the characters and interpret the pixels into numerically readable characters. The ANPR system has been used in traffic law enforcement, including speed camera, traffic light camera, stolen car detection, and border monitoring. It can be used also for the building management, such as parking management and gate control.

With the rapid development of highway and the wide use of vehicles, people have started to pay more and more attention on the advanced, efficient and accurate intelligent transportation systems (ITSs). The Number plate recognition task is quite challenging from vehicle images due to the view point changes, when vehicle bodies and license plate have similar colour, multi-style plate formats, and the non-uniform outdoor illumination conditions during image acquisition.

Machine learning approaches the problem in a different way. The idea is to take a large number of number plates, known as training data and then develop a system which can learn from those training examples. In other words, the machine learning uses the examples to automatically infer rules for recognizing number plate. Furthermore, by increasing the number of training examples, the network can learn more about numbers and characters, and so improve its accuracy.

II. PROBLEM STATEMENT

There is an escalating increase of contemporary local, urban and national road networks over the last decades. This has emerged the need for efficient monitoring and management of road traffic. The goal of this project is to create a model that will be able to recognize and determine the number plate from its image appropriately.

Due to the varying characteristics of the license plate from country to country like numbering system, colours, language of characters, style (font) and sizes of license plate, further research is still needed. The major goal of the proposed system is understanding Convolutional Neural Network, and applying it to the number plate recognition system.

III. LITERATURE REVIEW

During the last few years, the development of machine learning algorithms has gained progress in many aspects. Nowadays, with the increasing number of vehicles, number plate scanning using machine learning algorithms like K-Nearest Neighbours (KNN) will be useful as manual efforts of humans will decrease along with the error rates. Also, the accuracy of machine learning algorithms is quite high.

IV. EXISTING SYSTEM

The existing system to determine the details of a vehicle requires a lot of human interaction which also leads to human errors. For example, the e-challan fined by the traffic officials is as follows. A CCTV camera continuously records footage of the ongoing traffic. If a motorist breaks any traffic rule, the act will be recorded in the footage. The police will try to extract the number from the vehicle's screen-shot captured from the CCTV footage and the offense will be registered in the records. This process requires a lot of human resource which can be reduced by using the following algorithm to recognize the registered vehicle number.

V. PROPOSED SYSTEM

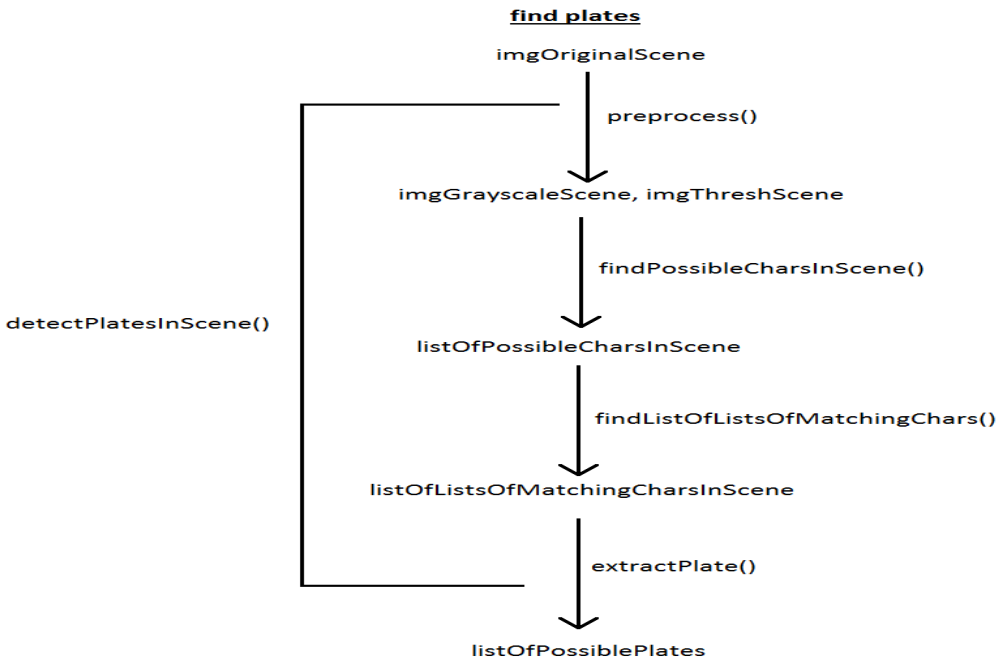
The first step towards Number Plate Detection is database collection which has been collected from Kaggle.com, one of the most popular and trustworthy sites which contains a variety of different datasets.
This dataset obtained contains number plates of different cars from different states having huge variation in their registration numbers.
The next step involves data preparation using the dataset obtained from Kaggle.

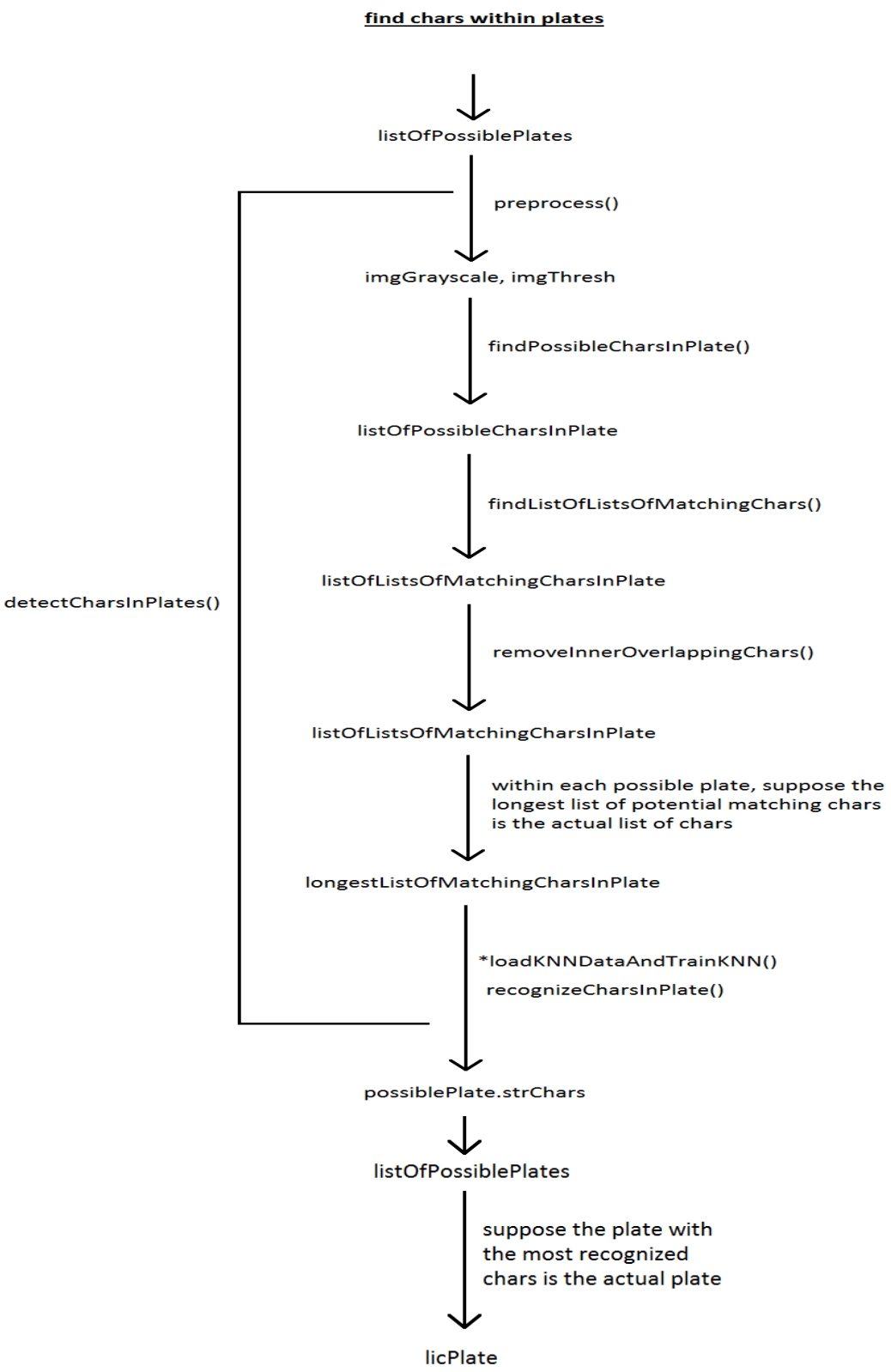
For preparation of our data, we implement the following steps:

- Data cleaning
- Reorder our data according to the pixel density.
- Splitting of data for Training and Testing.
- Create input samples.
- Create target outputs for the training and test sets.
- Convert data prepared to .png files.

After the acquisition of dataset and implementing data preparation techniques on such data the next step involves implementation of KNN algorithm to identify the characters on number plate.

Flowchart of the proposed system.


find plates
imgOriginalScene
preprocess()
imgGrayscaleScene, imgThreshScene
findPossibleCharsInScene()
detectPlatesInScene()
listOfPossibleCharsInScene
findListOfListsOfMatchingChars()
listOfListsOfMatchingCharsInScene
extractPlate()
listOfPossiblePlates



VI. RESULTS

Initially, the camera will be used to capture the image. Once the image is captured, the algorithm will process it by converting it into grayscale, followed by extracting the possible

number plates and finally recognizing the registration number of the vehicle. The final registration details will be searched from the database and will be displayed on the screen.

VII. CONCLUSION

Machine Learning Algorithms such as KNN is very effective for vehicle number plate recognition using machine learning. It consists of the outcomes of the result analysed based on the various parameters such as recognition of individual character and a digit success ratio of recognition for the success of identifying selected set of a character from group of characters and digits. From the above results, we can conclude that number plate recognition will perform better as the quality of the camera used for scanning the plate will be excellent. Using low quality camera will degrade the performance and may misclassify the characters.

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