A Novel Regional Transport Office (RTO) System Approach for Vehicle Identification

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***Abstract*:- This paper concentrates on design and development of an android based mobile application system that recognizes the characters in the vehicle number plate for identifying the vehicle details, vehicle location information and to communicate with the vehicle owner, police in case of emergencies. Objective of this paper is to capture the image of number plate using built in camera, applying image processing technique on captured image and recognizing the characters using OCR, to determine the vehicle location information using GPS.**

Keywords: Number plate, OCR,RTO Server.

I.INTRODUCTION

What is number plate?

A number plate is a metal or a plastic plate fixed on the front end and back end of the vehicle for identification.

Fig 1.Number Plate image

In the above fig 1, the current format of the registration index consists of 4 parts, they are:

- The first two letters indicate the state or Union Territory to which the vehicle is registered.
- The next two digit numbers are the sequential number of a district. Due to heavy volume of vehicle registration, the numbers
- were given to the RTO offices of registration as well.
- The third part contains 4 digit number unique to each plate. A letter is prefixed when the 4 digit number runs out and then two letters and so on.
- The fourth part is an international oval "IND" and the above it a hologram having a Chakra.

Automatic Number Plate Recognition (ANPR) is simply the combination of hardware and software which have the ability to read the character and number on the vehicle's license plate . Commonly, the ANPR systems are used in various access control and traffic law enforcement, namely toll gate access, parking area access and speed trap.

ANPR system works in five steps, image acquisition, image pre-processing, number plate localization, character segmentation and the last is optical character recognition (OCR) to recognize the individual character with the help of database stored for each and every alphanumeric character [3]. In this paper we eliminate the number plate localization step as we can capture only the number plate using Android mobile phone's camera.

Automatic Number Plate Recognition (ANPR) is sometimes known by various other terms, Automatic License Plate Recognition (ALPR), Automatic Vehicle Identification (AVI), Car Plate Recognition (CPR) and License Plate Recognition (LPR).

The ANPR was invented in 1976 by the UK's Police Scientific Development Branch [2]. It is just simply the ability to extract and recognition a vehicle number plate's characters automatically from an image. It consists of a camera that has the capability to capture an image, find the location of the number in the image, and then extract the characters for character recognition tool to translate the pixels into numerically readable character. It became much interest during the last decade along with the improvement of digital camera technology and the computational processing [1]. ANPR can be used in many areas from speed prosecution and management of parking lots. It can be used also to detect and prevent criminal activities and road control of parking violations in the prohibited areas.

In this paper we will propose a system, where image is captured through android application & undergoes image processing techniques to effectively recognize the characters and also fetches the current location of the vehicle. The vehicle number and current location information will be sent to the RTO server. RTO server contains vehicle registration details, alternative contact number and district police headquarters contact number. The vehicle current status and location information will be sent to police and alternative contact provided by owner.

II. LITERATURE SURVEY

[1]. In this paper, automatic number plate recognition (ANPR) was designed and implemented on Android mobile phone platform. First, the graphical user interface (GUI) for capturing image using built-in camera was developed to acquire car plate number in Malaysia. Second, the preprocessing of raw image was done using contrast enhancement, filtering, and straightening. Next, an optical

character recognition (OCR) using neural network was utilized to extract texts and numbers. The proposed ANPR algorithm was implemented and simulated using Android SDK on a computer. The preliminary results showed that our system is able to recognize most of the plate characters by almost 88%.

[2]. In this paper, we develop an Android program which processes the image captured by built-in camera of mobile device to have license plate number and save it into database for further applications. Open-source OpenCV libraries are imported into project for some image processing steps with purpose of programming time saving. We apply Tesseract engine and neural network which are two optical character recognition (OCR) methods to convert license plate image to machine-encoded text.

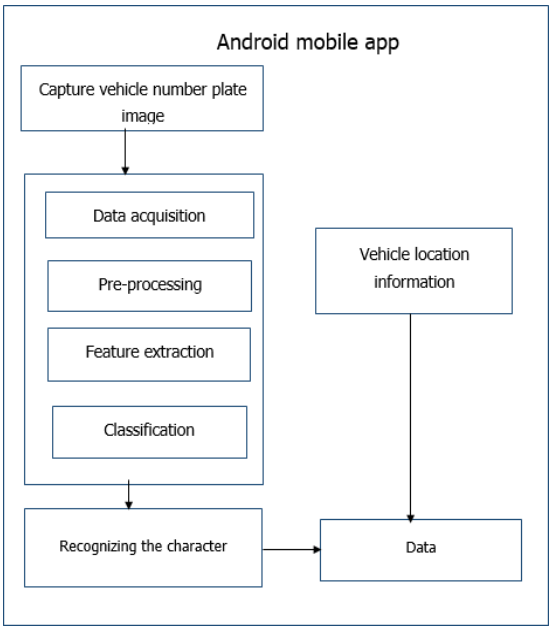
[3]. To cope with above mentioned problems and to ensure a better parking experience by accommodating increasing number of vehicles in a proper convenient manner, we propose a smart vehicle parking monitoring and management system called Campus Sense. In Campus Sense, Automatic Number Plate Recognition (ANPR) cameras and android based mobile application is developed to efficiently monitor, manage and protect the parking facilities at university campuses. Parking problems around the university campus faced by the students, faculty and staff members are analyzed by conducting a survey.

III. METHODOLOGY

This system is mainly divided into two parts. They are

1) Android Mobile App
2) RTO Server

Android Mobile App



Capture vehicle number plate image:

Image of the vehicle number plate is captured by the mobile application.

Image processing steps:

- Data acquisition – In this step captured image is converted into grey scale image.
- Pre-processing – It is required for colored, binary or grey-level images containing text. Images may contain background, water mark or any other thing different from the text, making it difficult to extract the text from the captured image. So pre-processing helps in removing above difficulties. The result after Pre-Processing is the binary image containing text only. Thus, to achieve this, several steps are needed, first, some image enhancement techniques to remove noise or correct the contrast in the image, second, thresholding (described below) to remove the background containing any scenes, watermarks and/or noise, third, page segmentation to separate graphics from text, fourth, character segmentation to separate characters from each other and, finally, morphological processing to enhance the characters in cases where thresholding and/or other pre-processing techniques eroded parts of the characters or added pixels to them. This method is used widely in various character recognition implementations.
- Feature extraction – It is the process of extracting differentiating features from matrices of digitized characters.
- Classification – It determines the region of the feature space in which an unknown pattern falls. In k-nearest neighbour algorithm, objects are classified based on the closest training examples in the feature space. The k-nearest neighbour algorithm is amongst the simplest of all other machine learning algorithms: an object is classified by a majority vote of its neighbours, with the object being assigned to the class most common amongst its k nearest neighbours (k is a positive integer, typically small). If k = 1, then the object is simply assigned to the class of its nearest neighbour. Generally, we calculate the Euclidean distance between the test point and all the reference points in order to find K nearest neighbours, and then arrange the distances in ascending order and take the reference points corresponding to the k smallest Euclidean distances. A test sample is then attributed the same class label as the label of the majority of its K nearest (reference) neighbours.

Recognizing the character:

In this step characters in the captured number plate image are recognized.

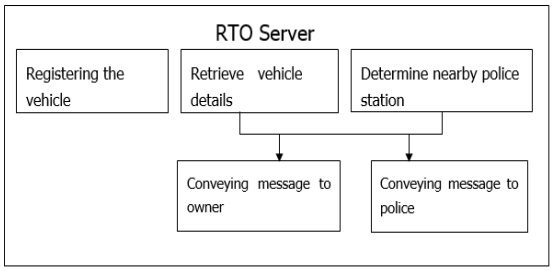
Vehicle location information:

Vehicle current location is fetched using GPS.

Data:

Vehicle number and current location of the vehicle forms the data.

RTO Server



Here vehicle details, alternative number of the owner and regional police headquarters mobile number is stored.

After characters in the number plate image are recognized, the vehicle number is sent to the RTO database along with the vehicle current location.

In the RTO database the vehicle number is compared. After that the status of the vehicle and current location is send to owner's alternative number and nearest police station.

IV.CONCLUSION

In this paper we have developed an android application, where image is captured by camera & undergoes image processing, fetches current location of the vehicle. The vehicle number and current location information will be sent to the RTO server. RTO server contains vehicle registration details, alternative contact number and district police headquarters contact number. The vehicle current status and location information will be sent to police and alternative contact provided by owner.

V.REFERENCES

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