

BORDER SURVEILLANCE USING ANPR

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Abstract : The ANPR (Automatic Number Plate Recognition System) may be referred to as an automobile screening technique that uses optical character recognition(OCR) on pictures to read vehicle registration plates. It is used here to input the variety of number plates that get pass through a toll gate. This information is used for various purposes, firstly for the general statistics of the vehicles passing through. Moreover the volume of automobile crimes has been on the increase and many new crime detection techniques have evolved on its account. These days , automobile thefts and high-speed car chases are very common. The best way to keep track of the cars is their registration numbers.

The principal objective of this paper is to categorize the vehicles on the basis of their states or areas where they belong and then use the data for various other applications some of which have already been mentioned above.

IndexTerms - ANPR, OCR, Localization, Recognition

I. INTRODUCTION

Automatic Number Plate Recognition System is a solution which detects vehicle in the field of view of the video and recognizes its number plate automatically. The system captures more than one images of the number plate and the most suitable image from the set of captured images is processed by the Optical Character Recognition (OCR) engine. The result of OCR is then saved in the central database and is available locally and to remote stations related within the network. The system can store information of the cars that go through, including exact time of recognition, visual image of both car and the number plate. It can also perform simultaneous search in databases for matching number plates and set-off alarms based on mentioned numbers of missing, stolen and other VIP vehicles.

Identification of vehicle allows the authorities and agencies concerned to monitor & control the movements systematically to make it smooth & efficient. Each vehicle has a unique Number Plate / Registration Plate prominently displayed & hence identification and classification of the vehicles based on these is the most logical and accurate method. Once the vehicle is identified it becomes easier to deploy strategies to design, control, authorize their movement/entry/ passage and also to capture violations.[14]

ANPR system has become an extremely critical technology application for Solutions like Intelligent Traffic Management System (ITMS), Highway Traffic Management System (HTMS), Toll Management System, Parking Management System and Entrance Management System for campuses, premises and cities.[4]

The optical recognition technique is performed at the remote computer level and it includes the following algorithms: [1]

- a. Plate localization: The number plate is isolated from the snapshot. [2]
- b. Plate orientation and sizing: The isolated number plate is then resized and rotated as per the necessities of the recognition software.
- c. Character Segmentation: Each character on the number plate is separated by drawing horizontal and vertical edges and thus making rectangles around the character.
- d. Normalization: After character segmentation, in the next step the brightness and contrast of the picture is adjusted.
- e. Character Recognition: Each character is then recognized with the help of the software. The software implements the technique of pattern matching to detect the characters, thus matching the characters with the already stored samples. The characters are then combined together to form the number plate [3].
- f. Syntactical analysis: Checks positions and characters against country specific rules.

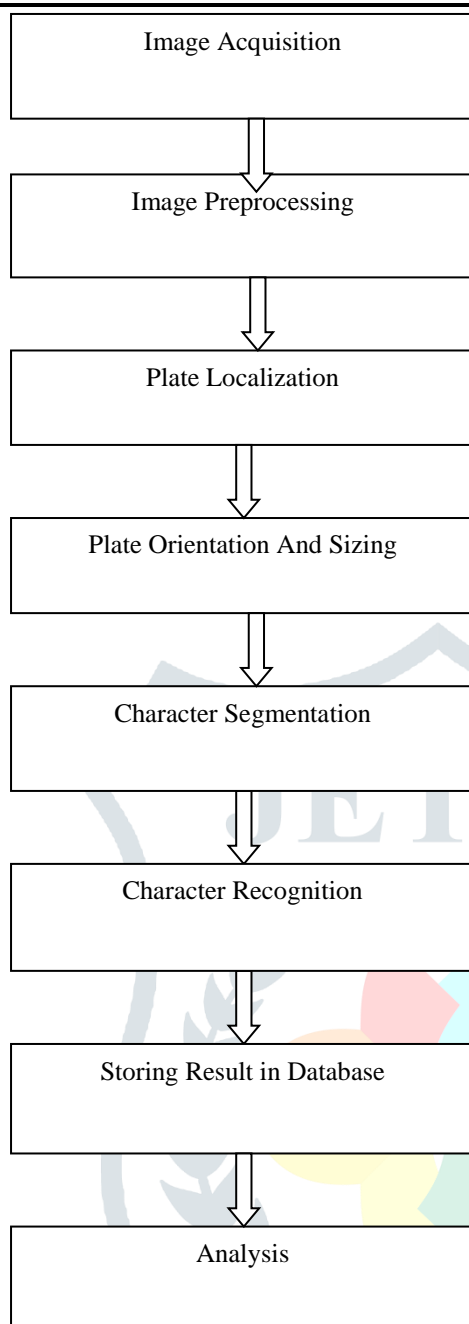


Fig.1.

II. LITERATURE SURVEY

Since the mid 90's ample amount of research work has already been carried out in the field of Vehicle Number Plate (VNP) recognition. The manufacturers of SPECS CCTV cameras say that the SPECS system is so good and user friendly that Manchester CTO processed 2,500 offences in 6 man hours [5]. Image Acquisition is the first step in an ANPR system and there are a lot of ways to acquire images. The existing literature discusses a variety of image acquisition methods. Salgado et. al. [10] uses a Sensor subsystem having a high resolution CCD camera supplemented with a number of new digital operation capabilities. However the installation of such a device is very expensive.

Naito et. al. [7], [8], [9] developed a sensing system, which uses two CCDs (Charge Coupled Devices) and a prism to split an incident ray into two lights with different intensities. The main feature of this sensing system is that it covers wide illumination conditions from twilight to noon under sunshine, and this system is capable of capturing images of fast moving vehicles without blurring. Yan et. al. [6] uses an image acquisition card which converts video signals to digital images which is based on a hardware-based image pre-processing. Kim et. al. [11] uses a video camera to acquire the image. Comelli et. al. [12] uses a TV camera and a frame grabber card to acquire the image for the developed vehicle LPR system [1]. But processing on the video feed is more difficult as every frame needs to be analysed and then the best frame is to be chosen for analysis. If a wrong frame is chosen then the recognition becomes inaccurate.

The LPL technique is used for extracting the number plate from the detected image. License Plate Localization (LPL) methods are categorised into Morphology based LPL methods, neural networks, Edge statistics and fuzzy based, template based and so on. The aspect ratio, variance, color, edge density are some of the license plate features used by these methods. High contrast between characters and background in a license plate is an important aspect which is considered in edge analysis. Character segmentation is a crucial step in license plate recognition (LPR) system. [13]

III. WORKING OF THE SYSTEM

When a car enters the camera field of view, the same is detected automatically and therefore the need to employ radar or inductive loop sensors is removed.

Automatic detection, motion analysis and recognition servers work together to send recognized number plates to Central Server which keeps the record of all the information in database which further coordinates with control stations. This seamless integration makes the access to data possible through network connectivity. While process of recognition goes on, the server allocated analyses the images from all connected cameras and stores them in the central database. ANPR is much more than only capturing number plates of the vehicles. It offers an aspect in studying traffic behaviour, allows controlling and managing traffic more effectively. By using different filters to navigate and analyse the vehicular data based on location, date, time-span and vehicle registration number plate etc. one can analyse the traffic flow, behaviour and other information which can be useful.

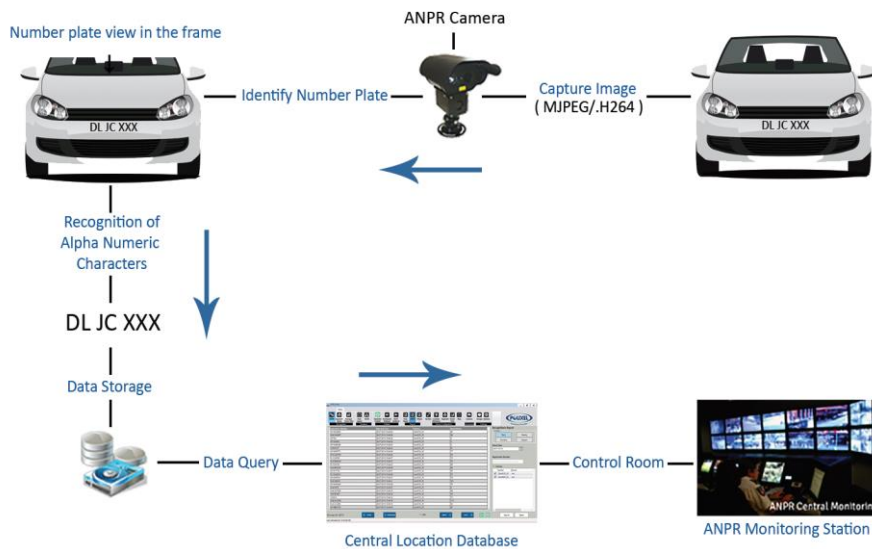


Fig 2.

IV. CONCLUSION

The data thus collected was used to identify the average number of influx of cars with license plate of different states to a particular state. This data is kept handy and will be used for further applications like theft catching, statistical models etc.

V. FUTURE SCOPE AND APPLICATIONS

This system has following applications and scope in various fields:

1) Crime investigation:

The system can be used for tracking of missing vehicles. In case of a car/vehicle theft, the car can be detected by searching in the vicinity of the region by using ANPR system. This can help in speeding up the process of searching thus minimizing the workload of the police force.

2) Illegal racing:

The practice of sale of illegal vehicles in the black market is not something unheard of. These vehicles are dismantled and exported part by part to other countries and then such vehicles are used for illegal racing and other money-making/entertainment purposes.

ANPR can provide an efficient mechanism to put a halt to these activities.

3) Over-speeding:

If a police officer detects an over-speeding car he can use this system to track down the car details and so the driver can be fined. This can help in avoiding the accidents.

4) Parking in the NO PARKING AREA:

The cars parked in the no parking regions can be detected even though no ground force is available on site.

5) Identification of traffic density :

ANPR system can be used to identify the low and high traffic density areas, based on the number of vehicles passing through a particular CCTV camera coverage per unit time. Thus if the number of plates detected by a camera in unit time is greater than usual then it means there is high traffic density otherwise the density may be low.

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