

Review Paper on Automated Number Plate Recognition Techniques

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Abstract:- Automated Number Plate Recognition (ANPR) system greatly enhances the ability of police to detect criminal activity that involves the use of vehicles. This system is used by local authorities and commercial organizations in all aspects of security, surveillance, and access control and traffic management. ANPR systems use Optical Character Recognition (OCR) to read number plates through CCTV systems, which enables vehicle registration numbers to be stored, analyzed and retrieved, as required. Radio frequency identification (RFID) is a generic term that is used to describe a system that transmits the identity (in the form of a unique serial number) of an object or person wirelessly, using radio waves. It's grouped under the broad category of automatic identification technologies. RFID is increasingly used with biometric technologies for security. In this paper we are discussing about various advantages and disadvantages of different methodologies used in the different systems

General Terms:- RFID, ANPR, OCR

Keywords:- Character extraction, character recognition.

1. INTRODUCTION

Basically, the ANPR process is divided into three main parts: Plate Detection, Character Segmentation, and Character Recognition. Each of these parts plays an important role in getting the accurate result. ANPR has its application in many areas like:

- **Car Parking:** In this, after detecting the number plate in parking area the number plate and ticket number is linked together. Thus improves car parking management.
- **Access Control:** Using ANPR in access control increases the security. It also helps in dynamic access of vehicles which usually helps in storing the vehicle owner information in the database.

- **Traffic Control:** ANPR in traffic control is mainly used to detect the speed of the vehicle with more reliability i.e., up to 94%.
- **Traffic Optimization:** ANPR notes the average speed of the vehicles and reduces the rush during traffic am.
- **Toll Enforcement:** It controls the vehicles that passes by the toll and increases the security.

1.1 Benefits of ANPR: The ANPR equipment with an All-in-One architecture deletes the disadvantages of the generic ANPR equipment, these are the following ones:

- It is simpler: All the necessary elements for the ANPR process are integrated in the same housing. Only one device is necessary for each lane to be controlled. The equipment may be connected by Ethernet or serial communication with the client application.
- **Modular architecture:** If equipment with All-in-One architecture does not work, its fall does not affect to the other lanes, because the Process Unit are deleted. Installation and start-up is easier.
- It is only necessary to provide 220V, Ethernet network or serial communication to each equipment.
- The installation is as easy as to screw the equipment with the support, to identify ANPR equipment with an IP and to adjust the objects.
- If one equipment fails, it is possible to replace it by another one. It reduces the cost.
- The wiring is reduced.
- The installation and start-up time is reduced.
- The maintenance of the system is reduced.

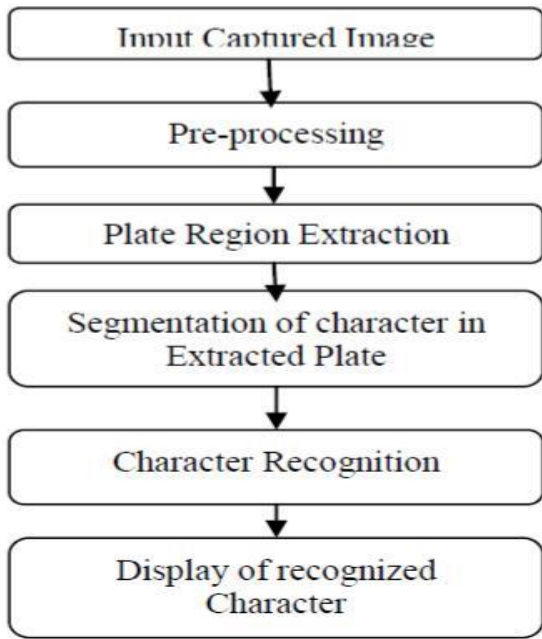


Fig.1.1. Structure of ANPR system

1.2 The Benefits of OCR technique: It increases the efficiency and effectiveness of office work. The ability to instantly search content is immensely useful, especially in an office setting that has to deal with high volume scanning or high document inflow. You can now use the copy and paste tools on the document as well, instead of rewriting everything to correct it. OCR is quick and accurate, ensuring the document's content remains intact while saving time as well

When combined with other technologies such as scanning and file compression, the advantages of OCR truly shine. Workflow is increased since employees no longer have to waste time on manual labor and can work quicker and more efficiently.

Radio frequency identification (RFID) technology has proven its usage diverse tracking and localization applications such as asset management, passports, transportation payments and inventory taking, etc. The RFID basic concept depends on storing data and retrieving it using tags, which are either embedded into the objects or attached on them. The main components of RFID tags are: an integrated circuit for storing and processing information and an antenna for receiving and transmitting signals.

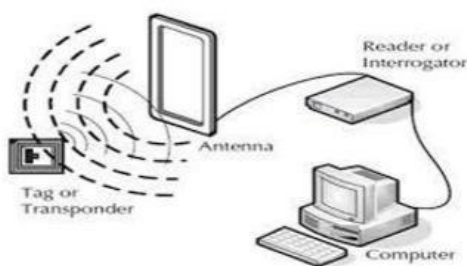


Fig.1.2. RFID system

More recently, chip less RFID technology has been introduced which allows for the identification of tags without the need for integrated circuits and by direct printing on the objects to be identified [3].

2. COMPARATIVE ANALYSIS OF X AND Y METHODS

From the paper by (Mohandes et al., 2016). This paper introduces a hybrid system for vehicle access control using RFID and Automatic License Plate Recognition (ALPR) technologies. The developed system is hybrid in nature and combines RFID technology with license/number plate recognition/identification(LPR) technology. So, in our system we are making use of Optical Character Recognition (OCR) to detect the characters.

The various steps used in processing are:

- The different vehicles (private or service) are provided with prescribed schedules of entry to the region.
- These vehicles are equipped with pre-programmed RFID tags.
- Upon entering the checkpoint area, the vehicle is scanned for an RFID tag.
- In the presence of a tag, its validity is cross-checked for entry at that specific time.
- Unauthorized vehicles are denied access and/or issued with a fine (Prevention vs.Deterrence modes).
- For vehicles without a tag, the license plate is identified using an ALPR system.
- To control the heavy traffic, about 50m before the checkpoint, lane dividers are installed to restrict access of each vehicle through a specific time.

Its advantages are:

- Supports data rates in the order of 2MB/s.
- Secured and private communication channel.
- Easy access and management of the system.
- Low initial and running costs.
- Easy integration with other traffic management systems.

Its disadvantage is:

- The system makes use of Artificial Neural Network (ANN) to detect the characters which requires a larger dataset and more training period.

From the paper by (Rahim and Iman 2017). In this paper, we see the online highly accurate system for automatic number plate recognition (ANPR) that can be used as a basis for many real-worlds ITS (Intelligent Transport System) applications. It also addresses various issues by presenting proper hardware platforms along with real-time, robust and innovative algorithms such as Canny Edge Detector in localizing license plates and Sobel Operator which works on detecting image edges. This system is

highly accurate in detecting the dirty plates. To achieve reliable evaluations, two new data sets were created and used in this paper: one for violation detection called “cross road data set” and the other for vehicle counting in highways called “highway data set”.

The main steps used in detecting license plate are:

- Finding license plate regions.
- License plate detection in localization: After extracting the regions that are most likely to include plates, a more accurate vehicle plate localization is performed based on the concept of Random Sampling Consensus (RANSAC). RANSAC is an iterative algorithm used to fit a robust mathematical model to a set of observed data. This method ignores the outliers and finds the best model to the rest of the given data. In this paper, a revised version of RANSAC algorithm is designed and exploited in license plate localization process.
- License Plate Localization in Night time.
- Character Segmentation.
- License plate character recognition.

Its advantages are:

- High accuracy, robustness and reliability.
- High detection and recognitions on dirty number plates.

Its disadvantage is:

- The algorithm used in this paper can be incorporated only on colored images but fails on gray scale images or images with low color disparity due to the fact that these algorithms need a medium to high contrast images for plate detection.

The paper presented by (Manish Pawar and Rachna Boliwala, 2016) Automatic Number Plate Detection is the technology is used to read vehicle number plate from an image containing a still or moving photograph of a vehicle. It is a major breakthrough in the technology which is very helpful for the law enforcements and traffic management authorities. This technology uses special kind of surveillance cameras to track down and record the vehicles registrations and track down their activities easily.

In this system to process the license plate Sobel edge Detection algorithm is used and the steps involved are:

- License plate detection.
- Input original image.
- Image dilation.
- Horizontal and vertical edge detection of the image.
- Thresholding by OTSU method.
- Filtering of garbage region in an image.
- Extraction of region contacting license plate.

Its disadvantage is:

Some factors does effect the detection of the number plate and they are quality of the camera, noise, visibility in the darkness, tilting, etc.

3. ACKNOWLEDGEMENT

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4. CONCLUSION

A cost-effective robust vehicle access control system based on a hybrid RFID-ANPR approach. The hybrid system to be developed consists of several modules covering sensors, RFID tags and readers, an ANPR module, and a communication unit.

RFID card based system will compare the details of the vehicle and automatically open and close the gate. If a visitor vehicle arrives, then its photo will be captured by a webcam and details will be collected by a person. All the details stored in server can be viewed through a webpage. The RFID tags permits the authorized person to trace the pupil's activity. Thus it increases the accuracy of detecting the number plate of the vehicles in all temperature and seasons like snowy, summer and rainy etc.

In the future work if the RFID system fails, then it switches to ANPR system where the image for high density edge regions which may contain a number plate is captured. Here we can also switch to the device that uses Raspberry Pi technology for detection of the number plate in real time applications which do not need man power and the system.

5. REFERENCES

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