Implementation of Smart Parking using Artificial Intelligence

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Abstract: Now a day vehicle parking is an important issue and the need is increasing day by day. In India we are still using manual vehicle parking system and that is why we are struggling with the waste of time and fuel problem, when we need to park our car, we need to park our car, which requires a good amount of lighting. Another issue is the chaos that occurs when parking because there is no special system. Anyone can park anywhere that sometimes causes damage to vehicles while going out or in the parking lot. Security is also an issue. To solve these problems we are introducing new car parking system. In this document, we presented an approach to help drivers under smart parking Find the right parking space efficiently and book it.

Keywords: vehicle parking, vehicle identification, character segmentation

1. Introduction

In recent years, the population of the world has increased, the complexity of transportation has dramatically increased. Consequently, there is mountain traffic increase in vehicle movement, the work of mountain movement of various institutions. These organizations, such as law enforcement, are responsible for monitoring every car and arresting the illegal vehicles. There is a lot of work to do, such as a license plate registered. However, on the streets, large number of vehicles made the task to more difficult work. Therefore, it is mandatory to identify vehicles using machinery learning techniques, and automatic vehicle identification has become the necessary stage in the modern transportation system.

1.1 Automatic vehicle Identification system

Automatic vehicle identification and recognition system is a self-propelled technology applied to the transport system, including electronic toll, collection and customs check points etc. Such a hardware as cameras, systems can identify the vehicle in every unique way and instantly. As the most important part, the automatic license plate identification (ALPR) is a form of vehicle identification. This is the image processing technology for vehicle identification by reading the vehicle registration plates. It plays an important role in the modern intelligent transportation system. It can be used to enforce traffic rules, collect tolls and bridge charges and identify people interested in law enforcement. Figure 1 shows an example of the ALPR application in law enforcement agencies. Using the ALPR system, we can identify each vehicle with high accuracy and efficiency.



Figure 1 A simple flowchart of ALPR

1.2 ALPR system

Usually, the ALPR system includes several key technologies. These methods come from machine learning, pattern recognition and computer vision fields. Therefore, the algorithms became an important part of the selection and editing process. Based on this, in order to design a perfect system to achieve the ultimate goal of the system what we did it is to get the license plate number from the captured image by the camera. Basically, this system consists of six steps. The figure 1 shows the steps of ALPR system.

1.2.1. Image capture

This is a hardware-based process, which is influenced by quality and type of camera, light strength, illumination and weather conditions. As a result, the image file is collected.

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1.2.2. Plate detection and localization.

This step is responsible for finding and separating the image on the board, which includes the searching, segmentation and changing files received from the previous step.

1.2.3. Image binarization and normalization.

Binarization is the process of converting a pixel image to a binary image. Image range can be obtained in different Binarization methods. It includes global boundaries, integration methods, aerobic algorithms, and so on. These methods can isolate the preview from the background. Therefore, this technique can provide us with white preview text and a dark background.

Usually server detection of several methods, image for noise reduction, image smoothing and image orientation.

1.2.4. Character segmentation.

Character segmentation is a key area of processing process and is a major processing for character identification. The board has been removed from the previous steps. To identify each character, the same character can be found in the picture. Many methods have been offered, such as projection, attached components or morphology. As a result, each character is extracted.

1.2.5. Character recognition.

Optical Role Identification (OCR) is an important step in the ALPR. Input characters can be noise or bad. OCR technology must be able to tolerate these conditions and produce results with high accuracy results.

1.3 License Plate Detection

There are three parts of "detection of license plate". These sections are part of the image acquisition, section localization or segmentation of number plate, and in a different form of image conversion. A brief description of the following sub-sections is as follows:



Figure 2. Architecture diagram of the thesis project.

2. Background

Lin et al. (2018) The proposed method can be used to identify a particular country to train the vehicle's licenses. For over 1,200 original license plate images, training and performance review, their process achieves 90% accuracy in the license plate characters identification and 100% of the license plate in the detected video. Better than their knowledge, this is the first license plate photo/video database in Myanmar, and automatically implement this automatic identification system. Dhar et al. (2018) Intelligent Transport System (ITS) plays an important role in intelligent system applications. The Automatic License Plate Recognition (LPR) system is an interesting part of which in the parking lot for many real-life applications such as surveillance, traffic flow monitoring, stolen vehicles tracking and maintenance. Can be used. This article focuses on designing the Bangladesh License Platform LPR Processing System. The first step is to check the board with a picture of the car. Detection involves pre-processing of input photos, edge detection, psychology expansion, and filtering regional features. Second, the board format is confirmed using a strong range of distance (DtBs). Thirdly, extreme points are used to correct horizontal tilt. After this, to extract the panel item, the acquisition of the letter is performed based on region's specialties and academic operations. Lastly, the points drawn by the automatic feature extract by Kazakhstani Neural networks. The simulation results show that the accuracy is quite remarkable. Zhai, W. (2017) this paper offers citizen urban parking management platform based on the NBIO Wireless Sensor Network (WSN) project aimed at the goal is to continue the full potential. Parking resources. After brief briefing of the NB-IT wireless communication and license plate identification (LPP), the authors have elaborated the overall architecture and image processing algorithm for the NB-IT Civilian Parking Program. The proposed plan is again with traditional wireless communication techniques. The results proved that the proposed plan was better than the traditional plan. Although is present in this research will provide powerful effects to the things of the Internet.

Farag et al. (2019) there is no doubt that parking is a very difficult and interesting surveillance theme. In recent years, many intelligent systems have been developed to control parking access to control and register car data. The purpose of this paper is to use image processing methods to control the smart parking door. The license plate identification measures are: pre-processing, license plate detection, characterization and identification. In the pre-processing image has increased and the noise is reduced. After a pre-processing phase, a color filter is used to detect the board area. In case of large image size, DWT is used to extract the feature and detect the time. In the role of the picture is converted from gray to binary to a small extent. After filtering the binary image

using the biological operation method, the biggest thing determines the distribution plate character. Finally, to identify the split parts used to the relevant method. In case of equality, the SVM is used to good rating. The experimental results use MATLAB software, which are considered to improve the board detection and identification rate. The detection rate is average 97.8%, the acquisition rate reaches 98%, and the recognition rate reaches 97%, recognition rate, so it will be a good method for smart parking entrance control. **Paidi, & Fleyeh (2019)** Parking is a difficult task in peak hours. The crowds to find parking vacancies and air pollution may increase. Information of a parking vacancies will help to multiply information and reduce the air pollution later. This paper is to identify the parking lot of a space, including free parking spaces thermal imager parking lot. Thermal imaging cameras capable of removing detection in all weather and light conditions of the heat car, and can also be installed in a public place. However, the thermal cameras are expensive compared to color cameras. The thermal imager can detect a vehicle heat without the exhaust light extrusion. Looks like heat or light based on the car absorbed by the vehicle. The vehicle is to identify, pre-trained the vehicle detection algorithm, a gradual direction-enforcement histogram detector, high-speed region convolutional neural network (FRCNN) and RCNN depth and implementing the fast-learning network. As the amount of heat in the vehicle is reduced the capture directivity gets wasted. Compared with other investigations, better RCNN deep learning network generates a better detection result. However, with large and more training data sets, the detection rate can be further improved.

3. Simulation Result

Automated parking systems require significantly less area and volume for a given number of parking spaces than other parking options. Automated parking systems enables the more profitable use of valuable land for tenants, green space etc. and provide property developers various options such as: minimizing the area needed for parking to maximizing the number of parking spaces or some optimum point in between the two.



Figure 4. No car detection Car detection



(a) Car detection



(c) Car detection

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3.2 Car Parking



Figure 7. Layout of Number plate Detection



(a) Number Detected of car plate

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Crignal Image	Detected Number Plate	
(b) Number De	mber Plate	
	Difected Number Plate	
Detect Car Nur	mber Piate	
(c) Number Detected of car plate		
Diginal Image	Descaled Number Plate	
Detect Car Number Plate		

(d) Number Detected of car plate

Figure. 8. Car plate number detection

4. Conclusion

Now a day's vehicle parking is an important issue and day by day its necessity is increasing. In India we are still using the manual vehicle parking system and that is why we are facing problems like wastage of time and fuel finding free space around the parking ground when we need to park our car which requires a good amount of lighting. Another issue is chaos that happens while parking because there is no particular system anyone can park anywhere that sometime causes damage to the vehicles while moving out or in the parking lot. Security is also an issue there. To solve these problems we are introducing new car parking system. The system works as follows: The driver will place the vehicle in front of the garage door and there will be a monitor available where the number of available parking slots will be displayed. The user will have to provide his mobile phone number and car's registration number and the operator will give command to open the gate, a car parking tray will come & will park the car in the garage.

5. Future Scope

- Smart recognition of cars: We can recognize the cars by their number plates with the help of image processing. By using this type of technology users can directly pay for their car parking using mobile phone's prepaid balance or car parking account balance.
- Updating Users about available slots and account balance: User can get updates about available slots of a particular parking space and account balance by sending a simple SMS to the data base.

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