An Intelligent Car Parking Allotment System Using CCTV Camera

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Abstract – Parking allotment and scheduling is an important problem in many traffic and civilian applications. With the problems of increasing urban traffic congestion and the ever increasing shortage of space, these car parking lots are needed to be well equipped with automatic parking Information and Guidance systems. Goals of intelligent parking lot management include counting the number of parked cars, and identifying the available location. This work proposes a new system for providing parking information and guidance using CCTV camera. The proposed system includes identifying car number plate, and identifying the car number for parking. The system detects cars through CCTV cameras instead of manual process. (In real time: A camera is installed at the entry point of the parking lot. It captures image sequences. The image sequences are then analyzed using digital image processing for vehicle detection and according to the status of vehicle occupancy inside, real time guidance and information is provided to the incoming driver.

Index Terms – CCTV, Parking, Scheduling, Vehicle.

1. INTRODUCTION

In recent scenario, most of the existing car parks do not have an efficient system. Most of them are manually managed and a small uneconomical and too manual. The problem that always occurs at the car park is time being wasted in searching for the available parking places. Users will keep on rotating the parking area until they found a blank parking spot. This problem usually comes in city areas, where number of cars is upper as compared to the availability of parking spaces .Various systems have been done to ensure softness of traffic in car park areas. From manual implementations used in the old systems, they have evolved into fully programmed, computerized systems. All entrances are controlled by gates whereby parking tickets are used extensively for access purpose. With the increase of technology, these systems have been easy in many ways. Nowadays, there are many methods used in detecting the parking cars in parking spaces as listed in references. In this paper, a web camera is used as a sensor for video image detection. This is due to its ability and comprehension cost. The similar paper that used camera for video image detection was presented in. This paper aims the edge recognition with boundary condition method for image detecting module while in used point recognition with OCR operator method. The authors used moving cars as a reference image to detect the parking spaces. The problem occurs when the entity is moving in high speed. It is difficult to capture its movement. Thus in this paper, the parking spaces recognition is done by identify the green rounded image drawn at each parking lot. In this paper we used VB.net as software platform. In this paper billing system provide for two wheeler and four wheeler separately.

Additionally, the project maintain following details such as Floor Details, number of cars can be placed in each floor, assigning token for the car, car number, duration of a car placed in a rack, employee details in a car parking area and generating reports. The system provides a graphical view about the details of parking area. The system will display the available area in green color. If the parking slot area is filled, then the area will be displayed in red color. Based on the color the admin can recognize the availability of the parking area. The system provides a complete interface for car parking with day, car wise reports. The system uses the printing option after the successful car parking area allocation. This project reduces the manual work and decision making problem by providing accurate graphical display of the parking area.

2. PROPOSED SYSTEM

Detection of any License Plate detection system is the usefulness of its algorithms. Six primary algorithms are used for this License Plate detection system. .In order to design a system for car parking, it is essential to first identify a car image that uses the white line detection of road to distinguish between the road and a moving car. Similarly, the car parks have a parking boundary line. Distinguishing between different classes of cars requires feature extraction from the binary image of the cars. The extracted features of a particular class of cars are expected to be similar and could be used to develop an algorithm to set different conditions for the motorists. The sizes of cars are class dependent; therefore, some classes of cars

could be categorized as being either big or small. Since the parking system has two conditions of either permitting a car to park or not permitting, the dimension of the classes of cars needs to be reduced to two for classifying it as big or small. Some factors that might affect data collection from the images are environment conditions such as light and presence of impurities in the object used for the classification.

This can be minimized with the use of some electronic devices to capture the images for classification. Taking images of cars in a controlled environment will also give better results. Some basic features for recognizing a car are through determination of its length, width and height, measurement of the distance between the tires along with the size of the tires. Some suggest the use of fractal dimension techniques commonly used in pattern recognition. The fractal dimension determines the irregularity of an object. The classification of cars using a general applet or algorithm will make life easy for controlling traffic and illegal parking. Highly accurate car recognition system will also help in automatic authorization in restricted areas. The classification and pattern recognition of an object requires basic knowledge of image processing [1] and OCR [2] and also requires computational approach and design.

In this paper, we discusses image preprocessing and capturing details including feature extraction techniques [3]. The paper also presents experimentation, testing and analysis of results with different number of vehicles. An objective of the paper is to determine a car's fitness for parking by considering the length and height of the car and comparing the car with its classes to verify the accuracy of the outcome. Parking lots have a standard length of 6 meters. To allow for such cars to park, their lengths and heights are a necessity in determining to which class of car they belong. First the car image is captured. Then, the system should take out the number plate of the car alone for the segmentation of character purpose [4]. This plate mapping algorithm is based on combine morphological operation responsive to specific shapes in the input image with a good entrance value by which the license plate is located. A big proportion of mapping of License plates is achieved by this algorithm. This difference can further composite the complexity for an algorithm to ascertain what area of a car constitutes a license plate and what area is not. Therefore, the algorithm must rule out a car's mirror, headlight, shock absorber etc. In general, algorithms look for algebraic shapes of rectangular proportion. However, since a car can have many rectangular items on it, further algorithms are needed to confirm that the identified object is definitely a license plate. To accomplish this, key components of the algorithm look for characteristics that would indicate that the object is a license plate. The algorithm search for a similar background color of integrated proportion and distinguish as a means to distinguish objects on a car. Cars are moving objects and their rate of velocity must be accounted for in the algorithm's design. This speed generate further complication as a license plates image is angularly twisted and subjected to refractor issues from beam changes. Finally a free slot will be identified and allotted. After the allocation, the GUI interface provides the free and occupied slots in the entrance differentiated by colors. The occupied slots are indicated as red and free slots are in green.

The software is divided into four parts from which the first one is for maintaining the employee details. The second one to maintain the floor details with the car holding capacity. The next one will be added to assign car in a vacant rack. The final one provides a report to the employees and staffs.

Parking area process entry: This phase is mainly based on admin. System will check the admin user name and password for authentication. After the verification for authorization the admin can be able to enter details of the floors in a car parking area or building and it's consumption to place the cars.

Number plate capturing process: The main task of this phase is to capture the Number plate details of vehicle using camera after the capturing process The system generates image files all the Number plate capture image files are stored in database for further process

Optical Character Recognition (OCR) process: The phases help Converting images with printed text to text format The first phase is giving input to the application. The character contained image will be given as an input, through several pre processing techniques it will be converted into characters. The image should be format. The initial stage should read all the details in the properties of the image and return the text format

Token generation: After receive the number plate of the vehicle token will generate. For generation of token this application automatically fetch the in time and date and Creating the controls dynamically for the rack numbers and out time time details and user mobile number and printout can be taken for the token these all token details are maintained separate table to view the token report efficient manner

Car assign and De assign process: This phase will helps to allocate parking place to user efficient manner using parking GUI controls dynamically system will check slot details whether already allocate or not once parking area allocated mean GUI slot panel will change red colors else panel slot color is in green colors so that system check and allocated parking position to user dynamically admin can check report with sitting place slot free or parking assigned.

SMS alert process: The SMS management is the process of enhancing the SMS service from the application. System automatically checks user parking out time details of the user if user out time exceed means user can get mobile SMS reminder. Reporting Phase for view the details of cars was parked and the time duration and submit this report to higher authority.

3. SYSTEM IMPLEMENTATION

The intelligent car parking system designed and implemented using VB.net and SQL server. The application consists of two types of parking, one is automatic allocation and another one is manual allocation.

In the design section the most significant was to outline the algorithm. Simplest possible algorithm was adopted. When the car enters the Car park the camera at the main entrance detects the arrival of the car, After detecting the car's arrival by the sensors the capacity of the car park is checked, if there is a free slot in the parking lot, the car is allowed to enter the car park and a security token is assigned to it, otherwise it is shown that the park is full. After assigning the security token the car is allowed to park in specific location which is shown on the display. As our intelligent Car Park System keeps track of all the parked cars, free locations and the location where the next car should be parked so when the car is parked the corresponding values are updated, the free locations or free slots are decremented by one and the allotted slots values are incremented by one. And if this was the last free location in the lot then it is displayed that the park is full.

At the end a counter is started to create parking token for it. Initially the car is in the parked state, when it exits, the time will be updated. After detecting the car the security token assigned is checked. As the Intelligent Car Park Management System keeps track of all the parked cars and free locations, the corresponding values are updated. The free locations or free slots are incremented by one and the allotted slots values are decremented by one. The invoice is displayed to the car leaving the lot according to its stay in the Parking System.

Implementation procedure:

1. Image Dataset Acquisition and Pre-processing:

Dataset of images are dynamically collected from different sources. Image converted RGB to gray scale all the processing steps are executed on gray scale image. Pre-processing is mainly used to enhance the processing speed, improve the contrast of the image, and to reduce the noise in the image.

2. Morphological Operation:

Morphological opening operation used using structure element on vehicle gray scale image then subtracted from original image .This operation remove pixel having a less than disk radius by opening it with the disk shaped structuring element. Thus the image and other parts which have less disk radius like lights are stay in new image and unwanted parts remove from image.

3. Thresholding :

Operation Threshold operation is converted gray scale image into binary image by calculating level of threshold. First find minimum and maximum value of pixel from the image.

4. Vertical Edge detection:

The characters on image contain abundant edges as compared to background area. This feature is employed for locating the candidate plate area from the input image. Vertical edge detection is used to find out the regions which have high pixel variance. To extract alphanumeric from the entire image, canny edge detection is used to select rows which are having particular white pixel density. Canny is more accurate on the curved edges than the VEDA.

5. Character Region Enhancement:

For character Region Enhancement first converted true character image into binary image by using gray thresh (image) function. Erosion operation is used for focusing each character. Here characters are in black.

6. Connected Component Analysis:

To remove the noise, other than characters on the image, connected component analysis is used. Each labeled matrix of 8-connectivity pixels is evaluated based on the area threshold. Image filling function is used for the component analysis of true number extraction.

7. Vertical Projection pattern Analysis:

Character segmentation is implemented to isolate each character on the image. Vertical projection analysis is used to find the gaps between the characters. The characters are segmented based on the number of valleys in projection. Row and column indices of each character are recorded.

4. CONCLUSION

It is concluded that the application works well and satisfy the needs. The application is tested very well and errors are properly debugged. It also acts as the sharing of files to the valuable resources. The proposed car parking system developed with high interactive GUI based components for fast car parking and allotments. The proposed architecture captures the car number and it's in time and verifies the parking slot availability. Additionally the application provides an SMS facility to intimate the parking hours for the users. The user can get the parking slot number and total duration parking etc., the application provides a convenient way for car parking and reporting. Using this application the admin can know the total parking area, allotted details and car number, date wise reports.

Future Enhancement:

The application has different type of future directions, such as car parking slot booking at the time peak hours. The application can be extended with additional alert process to the admin about the parking information via SMS.

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