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## Automatic Parking System using Image Processing

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**ABSTRACT:** This paper discussed on automatic parking system and electronic parking fee collection based on vehicle number plate recognition. The aim of this research is to build up and implement an automatic parking system that will increase convenience and security of the parking lot as well as collecting parking fee without hassles of using magnetic card. The smart parking system will able to have fewer interaction of humans and use no magnetic card and its devices. In additions to that, it has parking guidance system that can demonstrate and guide user towards a parking space. The system used image processing of recognizing number plates for operation of parking and billing system. Overall, the systems run with pre-programmed controller to make least human involvement in parking system and guarantee access control in restricted places. Paper presents algorithm technology based technique for license plate extraction from car images followed by the segmentation of characters and reorganization and also develop electronics parking fee collection system based on number plate information.

**KEYWORDS:** Digitization and Image Capture, Image Compression, Image Enhancement ,Image Restoration, Image Segmentation ,Image Representation.

### I. INTRODUCTION

Number plate recognition is a form of regular vehicle detection. A number plate is the exclusive identification of vehicle. It is an image processing skill used to identify vehicles by their own number plates. Real time number plate recognition plays an vital role in maintaining law enforcement and maintaining traffic policy. The classification of vehicles using a common applet or algorithm will make life effortless for controlling traffic and prohibited parking. Highly exact vehicle recognition system will also help in regular authorization in restricted areas. The classification and pattern recognition of an object requires general knowledge of image processing and artificial intelligence and also requires computational approach and design.

In that image pre-processing and capturing details including feature extraction techniques. The paper also presents experimentation, testing and analysis of outcome. An objective of the paper is to determine a vehicle's fitness for parking by considering the length and height of the vehicle and comparing the vehicle with its classes to confirm the accuracy of the outcome.

Nowadays, there are many techniques used in detecting the parking vehicles in parking lots as listed in references. A camera is used as a sensor for video image detection. This is due to its capability and realization cost. The related project that used camera for video image detection was presented in. This project apply the edge detection with boundary condition technique for image detecting module while in used point detection with canny operator method. In that we can used a moving vehicles as a reference image to detect the parking lot.

### II. SYSTEM MODULE

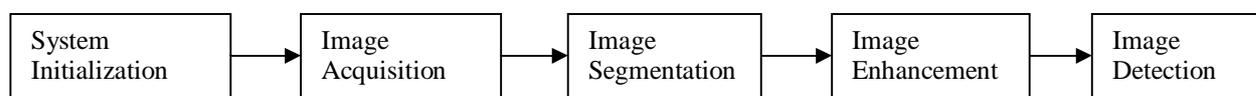


Fig. System Module

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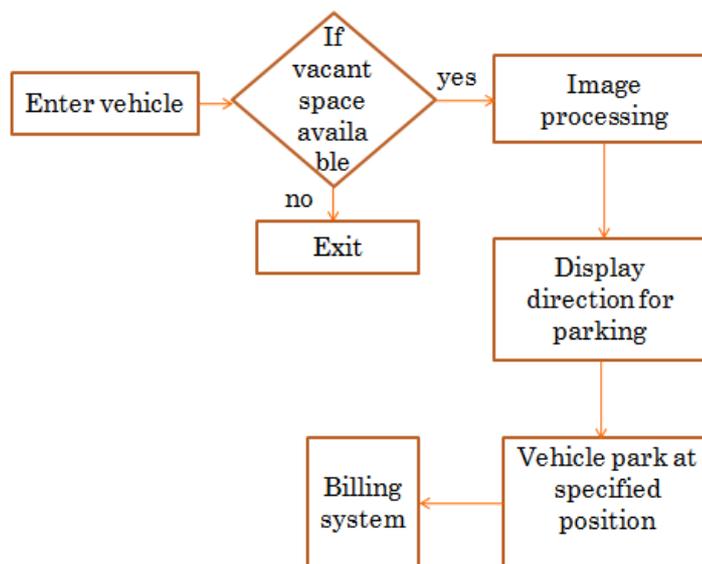
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Our paper consists of 5 modules. The first module is system initialization as a procedure to repeatedly identify slot of every parking lot in the image. The second is image acquisition module, which involves capturing and storing digital images taken from video camera. A vehicles park view is the input acquired by this module. This acquisition device is connected to a processing unit that runs in Java program. The third module is image segmentation, which divide the objects from the background and differentiate the pixels having nearby values for improving the contrast. The thresholding technique as a well-liked tool in the image segmentation is also used. The fourth module is image enhancement. In this module, the noise is removing by using morphology functions, which remove pixels that do not belong to the objects of interest. The boundary of objects in image is tracing which is rigorous on the exterior boundaries. The last module is image detection, which is used to conclude the rounded brown image drawn at each the parking lot. The overall module is illustrated in Fig.

Research work are summarized as following:

- To detect vehicles from video sequences .
- To detect number plate region.
- To segment each character individually from the license number plate .
- To recognize each character from segmented character.

### III. BLOCK DIAGRAM



The simple flow of process is shown in figure. This fig. is basic flow chart for Automatic vehicle detection and number plate recognition for video surveillance system. As shown in the figure, the first step is video acquisition system in which input video is going for the process. Then after using moving object detection technique vehicle is detected from the video for moving objection detection. There are mainly four methods to detect moving object from the video sequences i.e.

- Background subtraction
- Optical flow
- Frame differencing filtering
- Block Matching

In order to design a system for vehicle parking, it is necessary to first identify a vehicle image that uses the white line detection of road to distinguish between the road and a moving vehicle. Similarly, the car parks have a parking boundary line. Distinguishing between different classes of vehicles requires feature extraction from the binary image of



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the vehicles. The extracted features of exacting class of vehicles are expected to be similar and could be used to develop an algorithm to set dissimilar conditions for the driver. The sizes of vehicles are class dependent; thus, some classes of vehicles could be classified as being either big or small. Since the parking system has two conditions of either permitting a vehicle to park or not permitting, the dimension of the classes of vehicles needs to be reduced to two for classifying it as big or small. Some factors that power affect data collection from the images are environment conditions such as beam and presence of impurities in the object used for the classification. The paper also presents experimentation, testing and analysis of results. An objective of the project is to determine a vehicles strength for parking by considering the length and height of the vehicle and comparing the vehicle with its classes to confirm the accuracy of the outcome. Parking lots have a standard length of 5.6 meters . The testing is necessary, since different classes of vehicles have varying lengths within 2.3 meters. To allow for such vehicles to park, their lengths and heights are a necessity in determining to which class of vehicle they belong. By setting the maximum height and using experimentation put restrictions on heavy vehicles for parking.

## IV. PROPOSED ALGORITHM

### A. Background subtraction:

Frame differencing:

A motion detection algorithm begins with the segmentation part where foreground and moving objects are segmented from the background.

### B. Blob analysis:

The basic scenario of the Blob Analysis solution consists of the following steps:

Step 1: Extraction - In the first step one of the Image Thresholding techniques is applied to obtain a area corresponding to the objects being inspected.

Step 2: Refinement - The extracted region is often flawed by noise of different kind. In the Refinement step the area is improved using area transformation techniques.

Step 3: Analysis - in the final step the refined region is subject to measurements and the final results are computed. If the area represents various objects, it is divide into individual blobs each of which is inspected independently.

### C. K- Means Clustering:

Step 1: Randomly select  $c$  cluster centre.

Step 2: Calculate the distance between each data point and cluster centre.

Step 3: Assign the data point to cluster centre whose distance from cluster is minimum of all the cluster centre.

Step 4: Recalculate the cluster centre using cluster formula.

Step 5: Recalculate the distance between each data point and new obtained cluster.

Step 6: If no data point was reassigned then stop, else repeat from step 3 centre.

Step 7: End.

## V. RESULTS

As a result, smart parking system is able to recognize plate number, display free parking spaces and guidance parking system. This study output is a Java GUI which is an crossing point for users and drivers. Number plate detection results. To inspect the presentation there are 3 approaches have been discussed earlier, the performance analysis has been done to identify most suitable approach for characters detection algorithm. Smart parking slot detection system based on image segmentation have been experienced and projected in this paper. This results are included the sequences of the vehicle park detection from empty lot until the full parking lot.

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## VI. CONCLUSION AND FUTURE WORK

In this paper the growth of smart parking system with license plate recognition, parking slots status and direction parking system and billing system is effectively implemented. The performance of the developed of algorithms for License Plate Localization and License Plate Recognition is suitable range. The developed algorithms exactly localize and recognize in dissimilar location of the license plate. Electronic billing system performance is also acceptable and recommended for commercial use.

## VII. EXPERIMENTAL RESULT

As a result, auto parking system is able to recognize the plate number, display free parking spaces and guidance parking system. This study output is the OpenCV GUI which is shown in below. The following GUI is used to detect the number plate detection purpose.

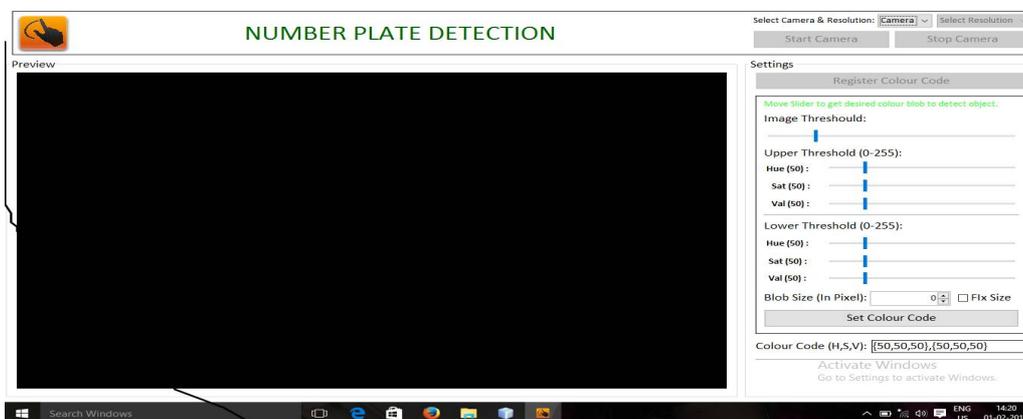


Fig.3. GUI of system

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