

Car Parking Management System

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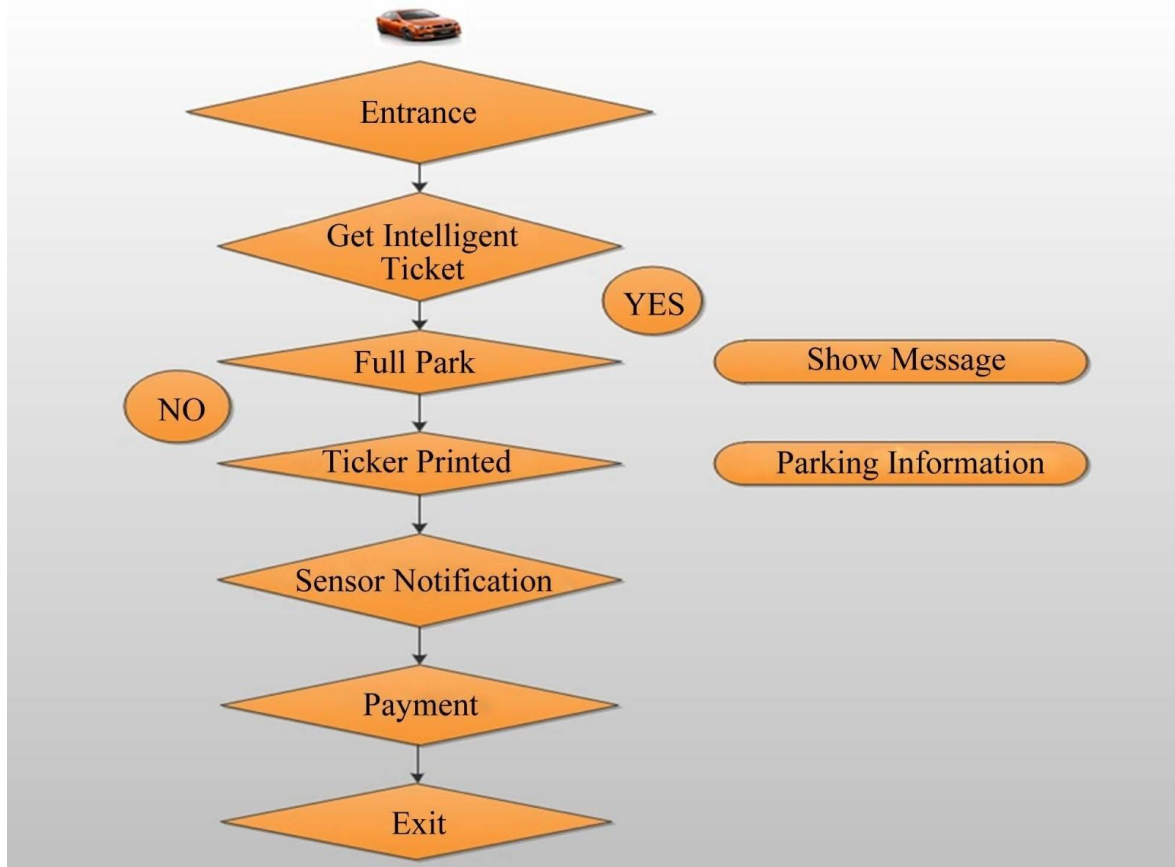
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Article Info	ABSTRACT
Article history: Received month dd, yyyy Revised month dd, yyyy Accepted month dd, yyyy	The aim of this work is to present an intelligent system for parking space detection based on image processing technology. The proposed system captures and processes rounded images drawn on parking lots to provide information about available parking spaces. In this work, a camera is used as a sensor to take pictures showing the occupancy of a parking lot. A camera is needed so that a single photo can identify different parking spaces. By retrieving this image, you can see the specific free parking space and use the processed information to direct the driver to the free parking space without wasting time trying to find one. The suggested information was used to direct drivers to available parking spaces instead of wasting time looking for parking spaces. The proposed system was developed as both a software and hardware platform. Automated parking systems are used to make the whole process of parking a car more efficient and simple for both drivers and managers.
Keywords: Parking Management OpenCV Python NumPy Unified Modelling Language Activity Diagram	
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1. INTRODUCTION

Today, most parking lots are not efficiently operated. This means that on busy days, drivers will spend a lot of time scurrying around the parking lot to find a free space. Implementation of this system will solve the growing problem of traffic congestion, wasting time and money, provide better public services, reduce vehicle emissions and pollution, improve the experience for city visitors, and improve parking. Helps increase garage utilization and avoid unnecessary capital expenditures. The system does this by providing more efficient and effective parking monitoring. An automated parking system can be achieved with park entry and exit sensors, a computer system that manages the entire process, and various display panels and lights that help the driver park the car.



There are many ways to detect cars in parking lots, such as magnetic sensors, microwave radar, ultrasonic sensors, and image processing [1] [2]. This project deals with image processing. It is used because the camera can capture many cars at once, which makes it efficient and cheap [3]-[6]. One or more cameras are used for video image processing. Software is required to process the images captured by the camera. This process is usually performed by looking at the differences between consecutive video frames. You can easily change the area that the camera scans. There are two ways to use this system: applying boundary condition edge

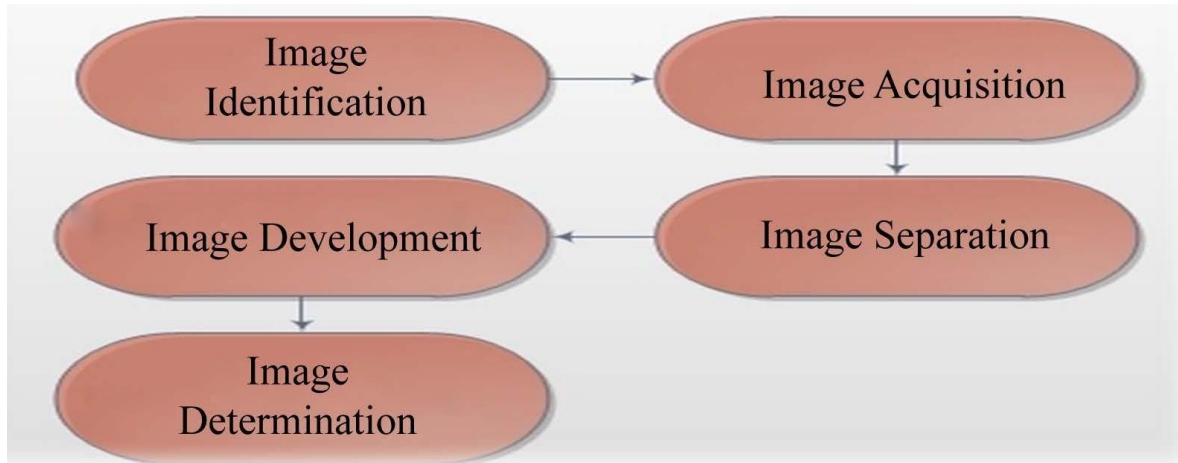
detection to the image detection engine, and applying smart operator point detection. In this project, parking spot detection is done by identifying the green rounded image painted on each parking spot. Matlab is used as the software platform. Two types of parking lot photos are used. The first is from Google Earth and the other is a photo of the actual parking lot. One or more cameras are used for video image processing. Software is required to process the images captured by the camera. Video image processing has five modules for this type of photography.

Contents:

- Introduction ,
- The Comprehensive Theoretical Basis or The Proposal Method or Algorithm
- Method, Results and Discussion, and
- Conclusion.
- Acknowledgement
- References & Biographs

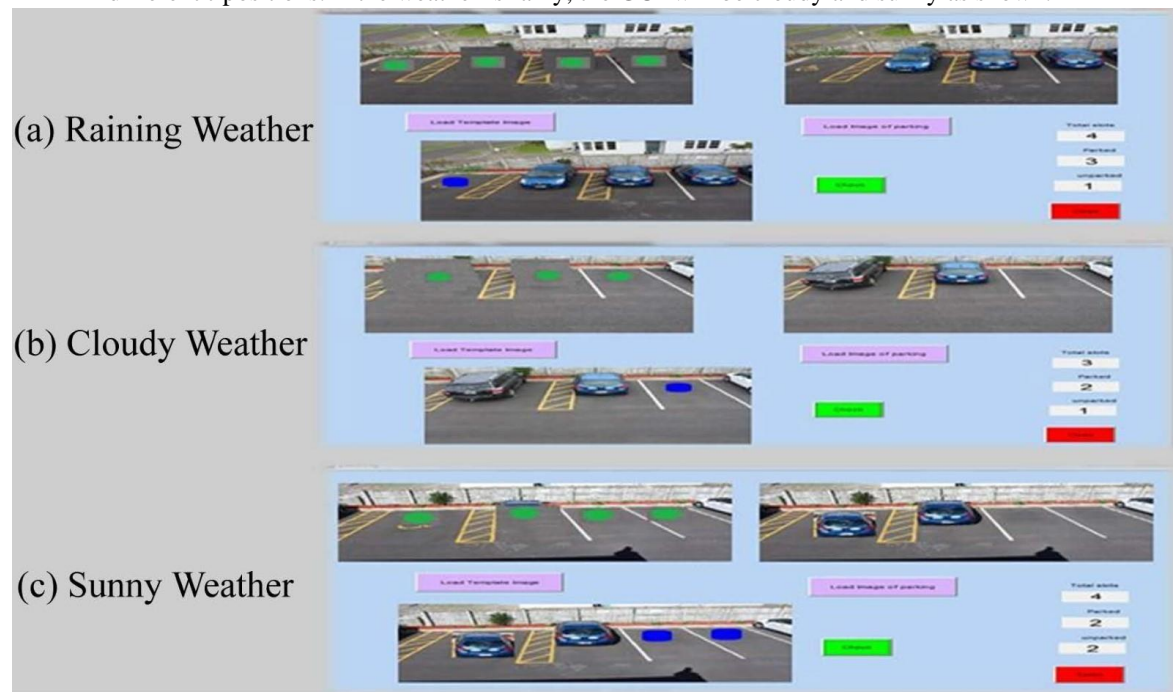
2. METHOD

First, you can capture an image of the parking lot when there are no cars in the parking lot. This is used by the system to retrieve all parking locations. You can use the RGB values to find out where the green circle representing the empty parking space is. This way the system knows where to look for the car in the future. The image is converted to an HSV image in order to obtain the location of the green dots in the empty parking lot. This is done using Matlab's `rgb2hsv` command. The HSV image is simplified to a binary black and white image for ease of handling by making pixels white when the threshold is above 40%. To do this, we need to convert the HSV image to grayscale format so that each pixel can be compared to the threshold as-is. This formula is shown in Equation (1). The `rgb2gray` command is used for this. $Gray = (0.299*r + 0.587*g + 0.114*b)$ (1) Convert RGB values to grey values using equation (1). As you can see, the green circle is noticeably brighter than anything else in the image. Therefore, you can easily convert the image to black and white using the `im2bw` command with a second argument of 0.4. This means that if a pixel is smaller than the threshold, its colour is black. Otherwise, it is white as shown in FIG. As you can see in the picture; there is a small white area in the image. These can be removed with the EDM function as shown. Use the `imopen` command to remove small dots in the image. The object used to erode the image was created with the following command: `se3 = strel('disk', 3)`. This creates a radius 3 disk that is used in the EDM feature. The figure shows the result of using this function. The following code shows how this is done: `if (new matrix (y, x) > 0) % there is an object if (e (new matrix (y, x)) = 0) this object is x) = x; the current x coordinate is equal to 3 index & value.`



3. RESULTS AND DISCUSSION

A program was written to generate parking positions with empty and full cars to test different parking scenarios. This way the graphical user interface can be tested with different numbers of parking spaces at different t-positions. If the weather is rainy, the GUI will be cloudy and sunny as shown.



4. CONCLUSION

An image-based procedure for detecting parking space availability was modeled and tested in different parking space occupancy scenarios. We've shown you step-by-step how to analyze an aerial photo of a parking lot. It finds the car coordinates of an empty parking space, takes an image with the car, converts the image to black and white for easy analysis, removes noise, and determines if the parking space is free or not. consists of judging The

current limitation of this document is weather conditions, which can be improved by filtering the images with higher quality transforms so that the camera can recognize parking lots in all weather conditions.

5. ACKNOWLEDGEMENTS


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