

An Overview of Parking Slot Detection Techniques

Ashu Yadav¹, Kirti Bhatia², Rohini Sharma³

¹PG Student, Sat Kabir Institute of Technology and Management, Bahadurgarh, Haryana, India

²Assistant Professor, Sat Kabir Institute of Technology and Management, Bahadurgarh, Haryana, India

³Assistant Professor, Government College for Women, Rohtak, Haryana, India

ABSTRACT

The aim of this study is to design and implement an automatic parking system to increase parking usability and safety and to collect parking fees for vehicles without having to use a magnetic card. A clever car park system can work with fewer human connections and does not need a magnetic card. There is also a parking assistance system that can advise and guide the user to the correct car park. In order to detect the number plates for the parking and payment system, the system used image processing. In general, the systems use pre-programmed controls to ensure that at least one person is involved in the parking system and control access to restricted areas.

KEYWORDS: Identification of parking space, smart parking, Electronic parking

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INTRODUCTION

In the parking lot, the parking system is employed to track arrival and departure cars. It may be time-consuming and stressful to find a parking location in urban areas. Effective parking guides can assist vehicles find a parking spot. Video systems offer a cheap alternative to typical sensor-based systems and can be used within the system for a number of functions through its camera input.

RELATED WORKS

A. The system is composed of a range of safe devices, including parking control doors, toll gates, time and presence machines and car counting systems. These features are needed nowadays to safeguard our cars and track the financial performance of all vehicles entering and leaving. The information collected in the Smart Parking System may only forecast the future pattern of parking for a parking operator. Data collected in order to improve the organization's profitability is also used to calculate the cost of parking. The technology benefits car owners since it shows available parking spots immediately, decreasing traffic and time spent searching for a spot. We have also reduced the number of vehicles that are improperly parked. Traffic congestion is also decreased. A smart parking system also has the benefit of ensuring safety, safety and security.

B. When using a vehicle parking system, drivers do not have to spend time looking for open parking, but they may go straight to the spot available, depending on the kind of parking system used.

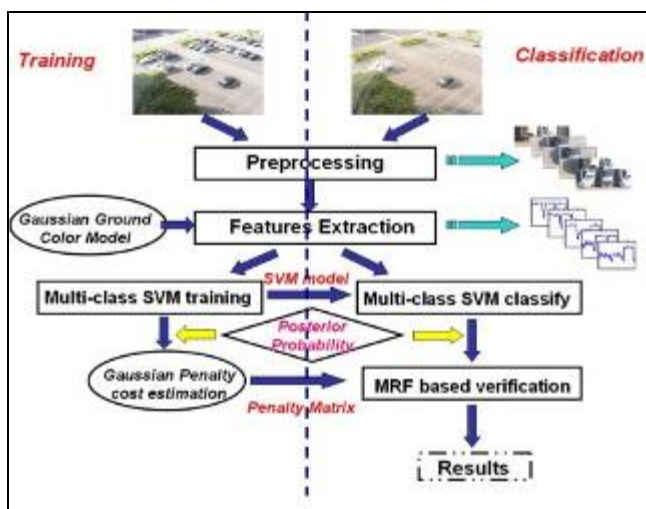


Fig 1: SVM Model

Driving around looking for a parking place may be hazardous since drivers' attention is diverted from the road to the available space. As a consequence, having access to the parking lot makes driving easier and reduces tensions and frustrations, improving parking lot safety. The parking system also looks for moving cars, which increases safety. Clients who park in other locations, such as on a conveyor belt, don't have to worry about how or where they'll park. They need just park the car anywhere and it will be transferred to the free zone. This plan may include at least 40% of cars in addition to conventional automotive parking. This technique eliminates the need for automobile owners to go around the park to look for a parking spot, climb stairways or perform mental gymnastics to remember their parking location. Although the system is renowned for its costly maintenance and other charges, it provides efficient space.

PGIS features may be divided into two categories. This may be used to monitor a whole city or a single car park. The following categories are often used in major cities across the globe, such as Japan, the United Kingdom and the US. PGIS offers basically the same advantage as the previously mentioned Smart Parking System. The decision-making process is quite similar. The system information assists drivers to decide how to reach their selected locations and locate parking spaces in the car park. The information communication mechanism, the information collection mechanism, the control centre, and the telecommunications networks are the four components of PGIS. PGIS utilises Message Signs variable to offer vehicles with a variety of options for finding an empty parking lot. The town parking lot in Weymouth, England, is marked with the number of spots available and the parking space orientation, as seen in Figure 2.



Figure 2: Car Parking Spot Example

At the same time, new camera-based technologies allow each parking spot to scan the licence plate of a car. This is essential because it enables the

identification of a particular vehicle in a certain parking space and the recording of possible problems at that location. Parking owners are more secure and save money as a result of this new technology. P-PGI supports municipal administration to improve mobility via new technologies, data integration, processing and a variety of citizens' data visualisation options. Free parking spots, road maintenance and recreation may be shown on the street, municipal events affecting mobility, urban news, and other helpful information. For purposes of parking advice, for example, the parking name and the number of spaces available are indicated, the way to reach it and the distance from it. This facilitates the finding and selection of free parking spaces throughout town by cars. The technique is also utilised in the corporate environment to lead visitors to, for example, the right parking lot on the campus of a firm. PGI is easy to link to other systems and data of the city.

VARIOUS ALGORITHMS

1. Smart parking system: This is a kind of parking system that utilises a more technical approach to overcome the limitations of the traditional way of paying for a parking metre. The traditional payment method, which requires cash drivers, creates delays and problems, is a superior way. The new payment system is less expensive both in terms of maintenance, processing payment staff and traffic control [17]. The intelligent payment system is utilised in, among other countries, Italy, the United Kingdom, the United States and Finland. This system uses many techniques.

2. Electronic parking: This is a vehicle park system that enables automobiles to choose or ask for space (figure 3). If one is available, you may reserve a space so that when you reach your location, you will not have a parking problem. Drivers may use the Electronic Parking System to reserve a parking area via several techniques, including SMS, telephone and online. Overall, this approach is utilised at airports (Airport Parking Reservation Systems). The advantages of the Electronic Parking System include removing any problems associated with obtaining a parking space.

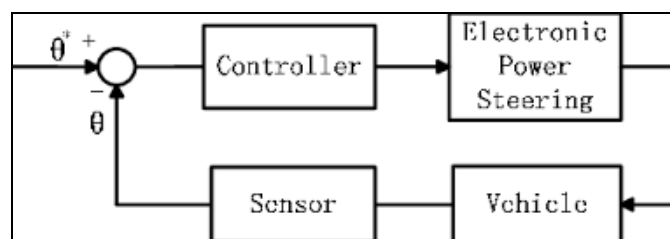


Fig 3: Electronic parking

The driver activates the switch, which sends a signal to the Module, which recognises the need to engage

the stopping brakes. This module then directs the actuators or electric engines placed in the brake callipers to operate. As a consequence, brake cushioning on the plate along these lines is restricted, restricting wheel growth.

Due to the use of electrical components, the activity of this framework is basically quick and effective. It also increases brake reliability due to the absence of mechanical connection. This brake deactivates automatically when the driver depresses the quickening agent pedal. With this technology, several manufacturers provide Assist capability.

3. Counter based parking: This kind of parking lot includes sensors to count the number of vehicles entering and leaving at the entrance and exit of the parking lot. The number of available parking lots is calculated by subtracting the entire amount of space entered by the system from the number of vehicles recorded by the sensor at the entrance. The number of vehicles entering a parking lot can count on this simple circuit. The LM311 (IC1) comparator, the 555 timer (IC2), the four-digit IC 74C926 (IC3), the four LTS 543 seven-segment displays (DIS1 through DIS4), the four BC548 npn transistors (T1-T4), the S2 foot switch and other discreet components form part of the circuit (figure 4).

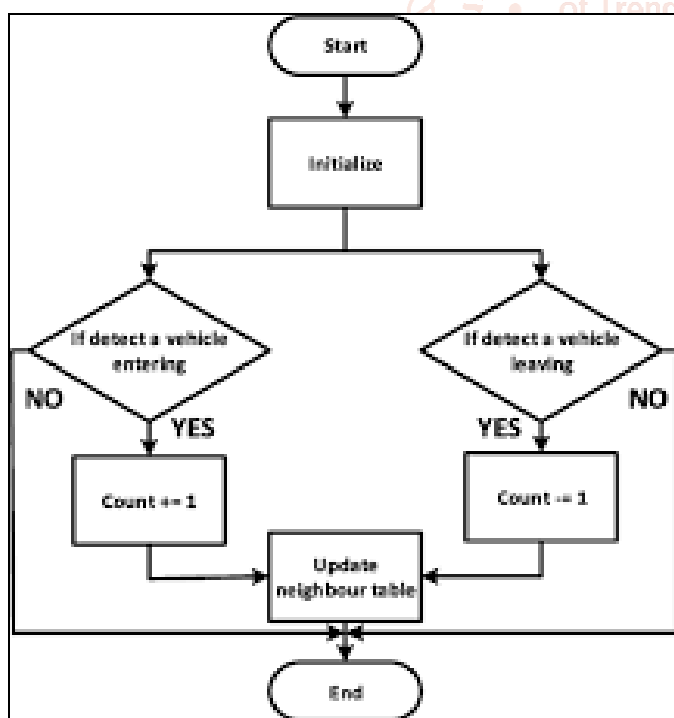


Fig 4: Counter based parking

4. Image based parking: This is the kind of car park that utilises cameras to record car park pictures. This technique is often used because the picture of the parking place is immediately changed when an image and a parking space is registered. As a consequence, a new picture and new data detailing the changes in the

car park are recorded. Below is a picture (figure 5) of the kind of car park. A camera is used to take an image of the parking lot in the image-based technique. This is useful since it can be determined which car parks are vacant using this image, which can then be used to direct a driver to a parking spot. However, cameras record a large amount of data, and sensors can be pricey.

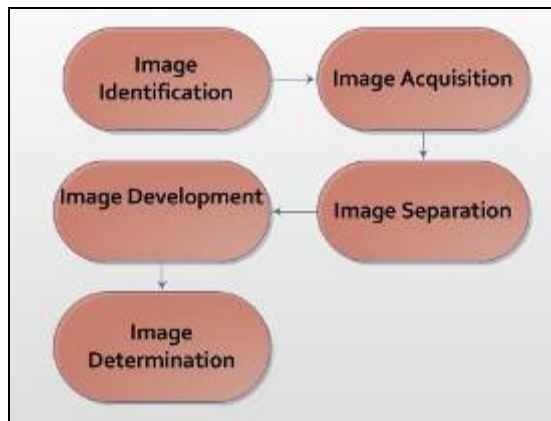


Fig 5: Image based parking

5. Wired sensor based parking: This is a kind of car park that utilises ultrasonic sensors for each car park linked by wire to the server (figure 6). This method is frequently used to gather car parking information from every car park. But this is considered costly.

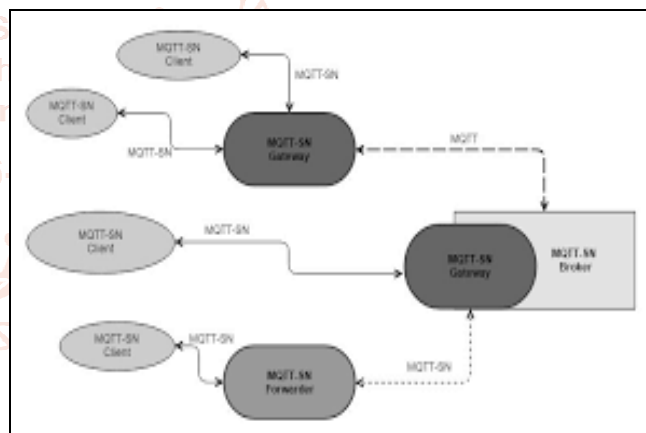


Fig 6: Wired sensor based parking

6. Wireless based parking: A system such as this is illustrated in the following figure 7. This technology sends data to an internet server that analyses it and to parking users with components such as temperature sensors, light and acoustics, which may check the availability of parking. A wireless system utilises nodes scattered throughout the parking lot to relay data wirelessly. This reduces installation and maintenance costs and improves the flexibility of the system. It demonstrates how a wireless system works. This system utilises light, sound and temperature sensor nodes that transmit data to a processing database via the internet and drivers who check online parking availability.

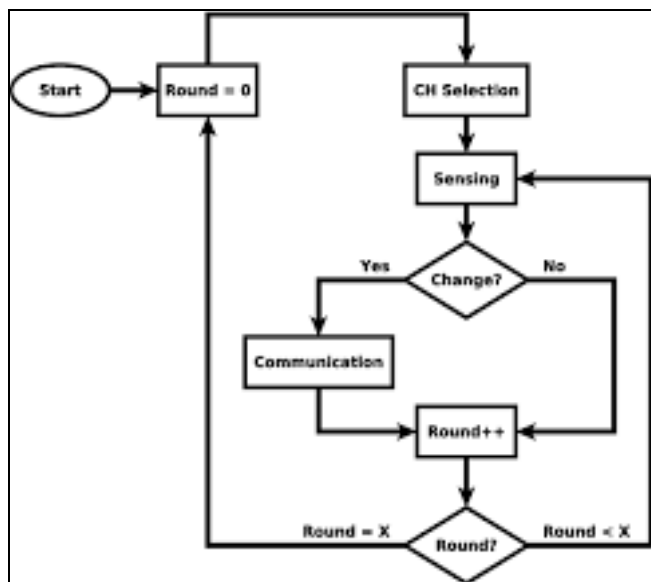


Fig 7: Wireless based parking

7. Conveyor belt based parking: The vehicle pneumatics are linked to two smaller conveyor belts which must fit beneath the pneumatic belt, so that the car may be pushed forward (figure 8). The transport belt parking system is considerably easier to use and understand compared to other parking systems. This method may simultaneously carry a large number of cars.

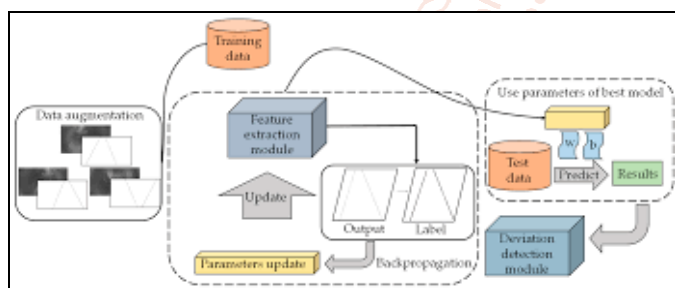


Fig 8: Conveyor belt based parking

RESULT AND DISCUSSION

Image processing has been utilised to design and test the smart detection system of parking lots. By recognising the rounded image detection on every parking lot as a reference for image detection the technique of photo detection as a reference will make the use of a moving item more efficient. The aim of this work is to identify the parking system with image treatment rather than with a sensor foundation. An integrated picture processing technique was used to construct a smart parking system to reduce sensor costs and wiring problems. Future work will focus on

safety parking systems as a supplement to smart parking recognition. A video detection system has been described for the parking lot occupancy. Using a method that has been outlined, the availability of four parks has been determined. A Matlab application that simulates foggy, wet, and sunny conditions has been demonstrated. Step-by-step instructions have been supplied for analysing an aerial perspective of the Template Images and Edge Images. This approach includes acquiring an image, converting it to HSV, extracting green circles, circle recognition, obtaining red pixels, reducing noise, applying morphological processing, and determining whether parking lots are empty or full.

FUTURE WORK

This application is an initial step in reaching the effective solution for the concern. This project can be extended in multiple ways.

- A central management system that make sure only authenticated information send to the client
- This can analyse while reserving a parking space by user or while renting a space.
- As for the future work the user can book a parking space from a remote location through GPS.

REFERENCES

[1] Wael Alsafery, B. A. (2018). Smart Car Parking System Solution for the Internet of Things in Smart Cities, IEEE.

[2] Rachapol Lookmuang, K. N. (2018). Smart Parking Using IoT Technology. IEEE.

[3] J. Cynthia, C. B. (2018). IOT based Smart Parking Management System. International Journal of Recent Technology and Engineering (IJRTE).

[4] Zong, W., Chen, Q.: A robust method for detecting parking areas in both indoor and outdoor environments. Sensors (Switzerland) 18(6), 1903 (2018).

[5] Giuliano Benelli, Alessandro Pozzebon University of Siena, Italy “ An Automated Payment System for Car Parks Based on New Field Communication Technology”.