Car Parking Space Detection By Using Background Subtraction Algorithm

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Abstract

Automatic parking system is growing rapidly in terms of parking aid products. Many of the automatic parking products utilizes user-interface based approach which involves ultrasonic sensors that consumes more time and money. This paper proposes a vacant parking slot detection through video surveillance, it will check whether slot is free or not. The real camera is fixed on the parking area it will monitor whatever events happen in parking area. Here, background subtraction technique is used to focus only on the object and subtract the images. Using foreground region it identifies object is in the slot or not, if object is in the slot it is called as "occupancy" otherwise it is called as "vacancy". Particular parking area can be divided and treated as a slot. In a real time situation, this is going to check whether slot is free or not and it also helps the driver to select one of the available parking slot.

Key words- automatic parking system , ultrasonic sensors , video surveillance , background subtraction , foreground region, occupancy classififcation, parking slot monitoring.

Introduction

Nowadays, a car driver is facing difficulty to park a car in a parking area, while going and checking whether the slot is free in the parking area or not. This process leads to wastage of fuel and time. The car driver can't reach the destination in time. So, we proposed a background subtraction technique, under foreground region is used to find

out place is free or full. The car driver knows it trough the android application, which is useful to indicate free space of parking area. The ultrasonic sensor based approach uses network of ultrasonic sensors. The ultrasonic sensor is installed at top of a slot of the parking space by using one sensor per the slot of the parking space. The available space detection is performed by detecting reflection distance of the ultrasonic sensor. Usually, before the ultrasonic sensor is used to find out parking slot situation but it leads more cost and time. Because it emits rays in parking area, suppose car is coming in parking area. The sensor will detect, object is came then information is passed to digital board, by using edge detection sensor in detecting whether the slot is free or empty .The proposed system of video surveillance plays a important role in many areas such as parking lot or public areas. It has an ability to detect abnormal events at a road and also detect available car space parking lot. Here, the importance function of video surveillance is to detect available space for car parking.

As, it is difficult to check frequently for the availability of car space we go for video surveillance technique that continuously monitor the parking area. Here image subtraction Technique is used for subtracting the image only focus on the object. For each object, each range will given for finding the car. Foreground object is the function of checking whether slot is free or not. All details of car information is stored into database, which includes the location of car, time of the car entrance and leaving of the car. In this way a video surveillance method helps to detect the availability of car parking space through android application which is simple and satisfies the driver's expectation. Through the android application the driver knows the details of car with an android mobile. When the car parking slot time is over a SMS is sent to the driver through the mobile.

Literature Survey

C.Harris et al. Made use of each video is converted into frames of sequence for understanding the natural scene containing,trees, roads,building etc.For this problem,the solution is to use of a computer vision system depends on the analysis of a monocular image sequence from a mobile camera.

SH.Azadi et al. Taken a automated parking of articulated vehicle is to explain the use of adaptive network based fuzzy inference algorithm. ANFIS was trained by creating a network of routes. In MATLAB , computer simulations to maneuver the car park is done. The simulation results shows the error of complex by using proposed controller according to automatic kinetic behavior of the vehicle is very suitable.

M.R.Schmid et al. Explained Indoor as well as outdoor environment parking spaces can be detected accurately using three standard range. The hierarchical occupancy grid based on the shape of the parking space it allows the dynamic level of detail control. It is not applicable to only one parking space it possible to apply parallel or perpendicular space.

J.XU,G.Chen et al. For practical situation the following data are required to park a car into an empty parking slot .It is properly based on the position and orientation of the empty parking slot and the position of the obstacles around it. The good guidance is provided by algorithm of vision and motion planning for autonomous parking and color. This all information is helpful in parking slot detection and obstacle detection.

H.G.Jung et al. Explaniation based on the drag and drop concept, this paper propose a novel manual target designation method. User want goes to target position is displayed as a rectangle and the driver can easily move the target by dragging the inside and can rotate the target by dragging outside ,so it reduces the operation time and clicking number.

Luciano Spinell et al. Use of novel human detection method that combines camera and laser scan information. Two of the most recent and reliable human detection method can be fused together using bayesian fusion. In this paper the key point is to convergence of two different method with different sensor to obtain a more informative detector. Eventhough person is far from the system detection can be solved individually by each sensor. In hard examples the proposed sensor fusion especially can increase the detection confidence.

Dohyun Kim et al. Proposed a model based nonlinear control technique another name is called as dynamic surface control.It is used to develop lateral control law for forward driving and backward parallel parking maneuvers. Preview control switching of multiple controllers and filtering of the steering command is used to compensate for performance degradation because of measurement noise and manual control of velocity **.**

ArataTakahashi et al. With the use of extended hough transform and a birds eye view image effectively improving the robustness and resolution of lane detection. It configuration depend on the rear view camera of a parking assistance system and also it uses an inexpensive system **.**

Jifu Zhou et al. The problem of this paper is to detect parking spots in semi-filled parking lots using on board laser line scanners .The proposed system uses a laser range scans for identifying vehicle bumpers and to achieve vehicle detection using a supervised learning technique.

Ho Gi Jung et al. The function of monocular vision based parking slot markings recognition algorithm is used to automate the target position selection of automatic parking assist system. Recognize marking lines using peak pair detection and clustering in hough space. If the guideline is successfully recognized . Dividing marking line segment easily matched and recognized by T-shape template.

Najmi Hafizi Bin Zabawi et al. Used image processing technique the outdoor parking lot area detecting the occupancy .For increasing the detection reliability apply twin ROI on each parking space. Here standard web camera is using for the accuracy of the detection.

Christian Unger et al. Find out commercially used active sensors like ultrasounds cost and precision is not favorable. Passive sensor such as video camera is

quite suitable because of their low cost. So we proposed a parking assistance system is used to show the flexibility and robustness with different application. Our system is more reliable when compared to ultrasound and feature based motion stereo solution

Karthik Nandakumar et al. described that the unimodal biometric systems can be affected by noisy data, non universality unacceptable error rates like that. It is overcome by multimodal biometric system in different way such as various fusion is possible and fusion takes place in feature extraction level ,matching score level or decision level.

Jae Kyu Suhr et al. designed a novel fully automatic method is helpful for recognizing various parking slot markings .It acquires a around view monitor to gaining popularity as a parking aid product. When compared to sophisticated heavy detector cannot achieve the robustness against diverse practical situation whereas as simple detector overcome this one. The resulting slots are clustered based on the types and orientation. In which the cluster contain predetermined number of slots are taken for final parking slots

Proposed System

The proposed technique is an appearance-based approach, which can be used to detect available car parking space. The background subtraction with adaptive background model is used as the object detection module. So performed foreground regions detection by using background subtraction with an adaptive background model.

Image subtraction technique is used to subtract the image which removes the image other than car in parking area. Under, image subtraction the foreground region only checks whether object is in slot or not. It will check object is by means of giving some range for car from input video up to SMS delay car using MATLAB. In MATLAB server3 slots should be allocated and for each slot time is mentioned through SDK information is passed to the web server. Web server contain information such as total number of slots available and number of slots that are booked.

The above figure of proposed system, describes the input video what camera captures and converts into frames. After conversion of frames we apply background subtraction algorithm for removing unwanted images and keep only the wanted object. The decision making process is done by foreground region. These information is stored into server. The status of the slot is updated into web server through database. In the android application it shows the graphical view for engaged and free slot locations. By assuming the number of locations as three we are going to check the status of slot in a real time situation**.**

After checking all the information is stored into database. Database contains number of slots, slot availability data, location and date and of the car while the car is entering and leaving. If the slot time is over, it will indicate by means of message sent to the user's device. In parking area, the camera will be fixed this captures all details of car that are useful for driver. It not only captures the car, but also the events that

happen in parking area. After capturing the video is converted into frames. These frames are passed to background subtraction.
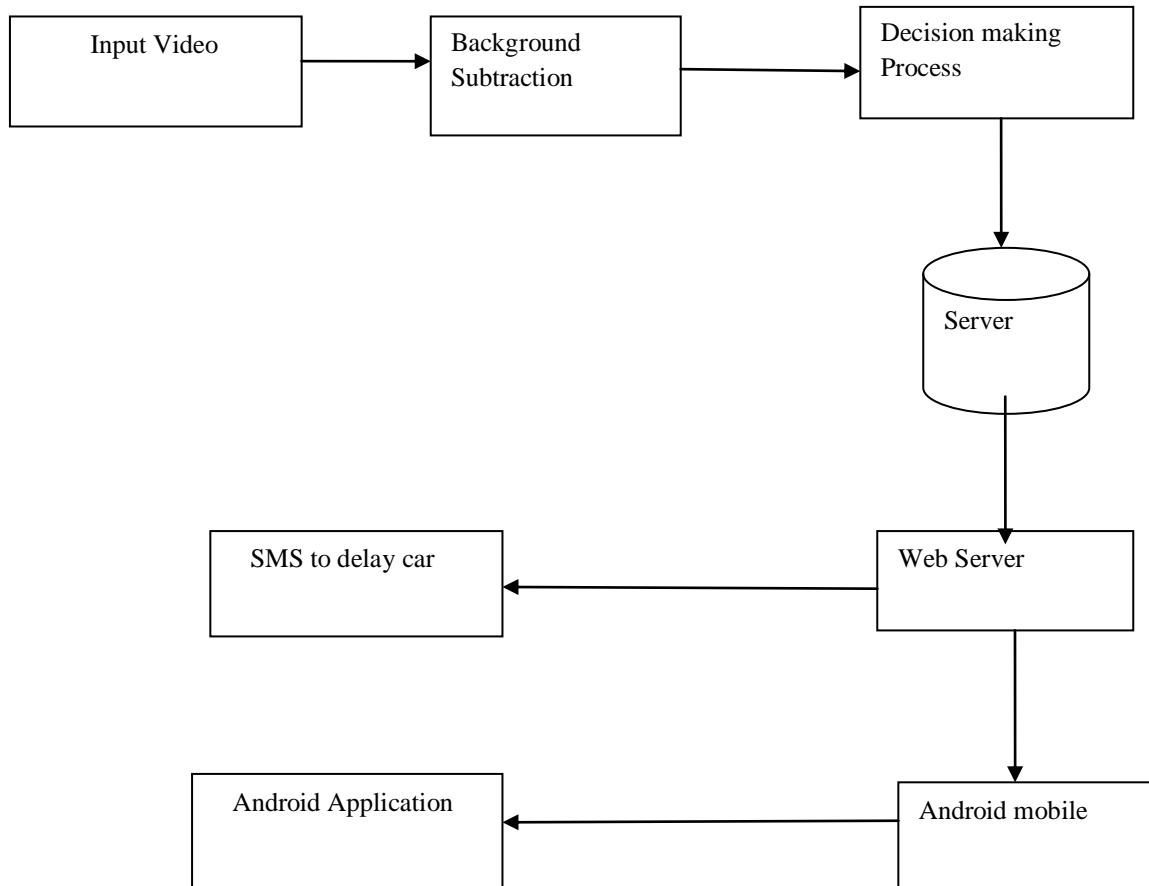
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┌─────────────┐      ┌──────────────┐      ┌──────────────┐
│ Input Video │─────▶│ Background   │─────▶│ Decision making│
│             │      │ Subtraction  │      │ Process      │
└─────────────┘      └──────────────┘      └──────────────┘
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│ SMS to delay car│◀────────────────────────│ Web Server   │
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│ Android Application│◀─────────────────────│ Android mobile│
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Fig: overview of proposed system

Background Subtraction

Background Subtraction is a computational vision process of extracting foreground object in a particular area. A foreground object gives full attention on the object and helps to reduce the amount of data that is to be processed as well as provide important information to the task under consideration.

Web Server Process

Decisions get updated to web server each time when it get changed and receives the values from the database via MATLAB. We send SMS and MAIL (eg: 1 per day) to

the administration for delayed car duration (eg: 12 hours above) based on Validate the information's.

Android application Service

Android application collects all information from server through web server, and it calculates total number of slots that are engaged and free. It shows graphical view for engaged and free slots via apps. It validates information continuously to the web server.

SMS to Delay Car

For each car slot time will be given in parking area. Suppose if the driver make any delay in taking the car from the parking area and once the car slot time is over the message is sent to the driver by SMS through android mobile.

Decision Process

When the car parking area was filled it is defined as "occupancy". If the car parking has a free space it is defined as "vacancy". The decision making is stored into the server part.

Advantages

- It takes less time to detect the slot in parking area.
- Cost is less for detecting the slot.
- It informs the finishing of slot by sending message to the user.
- Checks the status of slot in real time.

Conclusion

Therefore video surveillance is used to monitor the events that occur in parking area with less cost. Using foreground region it will detect slot availability in the real time situations. With android application the driver knows all car details that are useful for him to park the car in an empty slot.

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