SMARTPARK-Intelligent Parking Application using Image Processing

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Abstract- The Review paper discusses about the growing problem of car parking in urban areas due to the growing population .Due to growing population the number of vehicles has increased simultaneously and because of the limited parking lots, the problem of car parking is proliferating. In order to stop this, a system has been proposed to provide whole extensive proof based on growing urbanization, increasing traffic flow and technology growth for implementing innovative help and services to public transport system with aim to accelerate local social wealth by providing a mobile phone application for real time scanning and searching for available parking area and tracking the vacancy in the parking lot using existing technologies i.e. CCTV cameras. By having the image of the area, the particular car park slots can be detected and thereafter the processed information can be used as to guide the driver to an empty parking slot which will save his time. The whole idea is to make car parking more efficient and less tedious for the drivers.

Keywords- SmartPark, Intelligent Parking, Image Processing, CCTV.
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I. INTRODUCTION

The substantial increase in the motor vehicles in the past few years is clearly visible in the form of traffic and the cost of parking space in the societies.

It is very important to design and establish a system that can track parking space efficiently. Our System proposes parking space detection using image processing and cloud based tracking application. Using the existing CCTV cameras and using image processing algorithms parking space can be tracked for vacancy and the live feed can be made available to the public using cloud and a dedicated application.

The system involves using existing CCTV cameras or any camera even of a mobile phone to track the parking availability of a particular area.

The system wants to achieve three objectives:

* Process CCTV footage and track parking vacancy.
* Create a database and a virtual map for parking lot and map both.
* Android application which shows number of vacancies and map showing vacancies in green.

II. EXISTING SYSTEMS

With the growing population in urban areas there has been a tremendous increase in the number of vehicles in the cities. Nowadays every building, malls, offices etc. has and requires a parking space. We have seen that in these parking space either there is a parking keeper who keeps a watch on the available parking slots and accordingly guides the driver as in where to park their cars or in big malls there is a light above every parking slots either green or red to indicate availability. One of the existing system also include where satellite imaging is used to detect the empty parking slots across the city or a town. But the drawback of this system is that the image updating of satellite does not takes place in real time and also unreliability of the connections takes place [1]. This approach also misses out on detecting the parking areas available inside indoor facility i.e. the buildings completely just built for generating parking space.

There isn't any automatic or computerized system to detect the availability of current parking scenario. The proposed system therefore breaks the ice.

III. PROPOSED SYSTEM

The proposed system uses the concept of image processing algorithm. The primary function of this algorithm would be to detect whether a particular parking slot is available or not and accordingly respond on the corresponding application, which a user can view it on their smart phones via an application. It will be viewed as if which parking slot is available and which is not and accordingly a user can make up his/her mind to take their vehicles to that particular spot or not.

One of the proposed system is as seen in Fig. 1., in this system if the existing camera is able to capture the entire parking area and the positioning of the camera is flexible then it the approach is more reliable. In this approach, larger areas can be captured and the detection can be taken on a larger scale. The image will be processed block by block for the whole parking area and the empty lots will be marked with GREEN dots and the lots where cars have been parked will be marked with RED dots. Accordingly this information of the current status of the parking area would sent to the system every half a minute or so and thereby ease the situation of parking a car [2].

Another approach includes pattern matching. As seen in Fig. 2., in this approach the image of the area would be taken during when no car is parked and all the cross on every lot can be seen and thereby matching this parent image with the image of the current situation of the parking area will help in detecting the parking space..There would be rectangular blocks of parking slots of particular dimensions which the CCTV cameras would be able to recognize with the help of backend image processing algorithm. Within each parking slot there would be a cross marking which would be visible to the cameras. If that cross marking isn't visible to the CCTV camera it will mark that parking slot in RED colour in the application i.e. that parking slot is no more available and if cross marking is available it will mark that particular

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parking spot in GREEN color i.e. that parking slot is available. This approach would be useful when the parking area is small or is located at the indoor commercial complex facility and also the positioning of the camera is not flexible. The camera would be able to capture the image having 270° coverage of the area in front of it [3]. Both the proposed approaches are efficient, feasible and reliable.
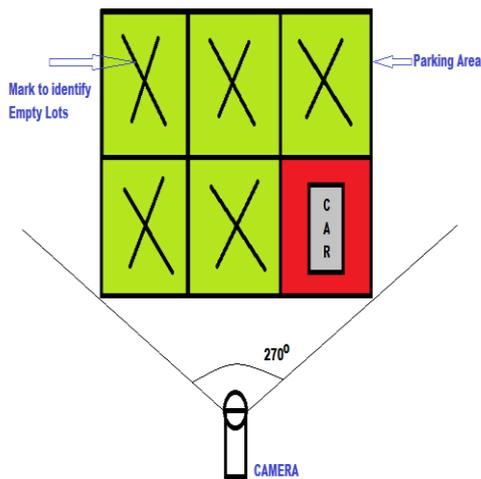

Fig. 1. Detection of empty and filled parking lots [4].

Fig. 2. Detection of empty lots using cross marks.

IV. CURRENT IMPLEMENTATION AND RESULT

The current CCTVs will be equipped with a backend image processing algorithm which will detect whether a particular parking slot is available or not. Accordingly it will mark a particular parking slot green or red depending on their availability. This project is to be mainly applied with lots of MATLAB library files. One of the main reason of using MATLAB library files is that it is open source and there is a lot of way to use its library files. The implementation using MATLAB can be integrated with Microsoft Visual Studio or Android Studio to generate the flow of detecting the parking space [5]. As seen in Fig. 3., the frame is developed on the

captured image and the car is been brought on one the slot. The program processes the image frame by frame and decides the result of marking that slot as RED due to car been parked in that slot [6].

At the same time, as seen in Fig. 4., the virtual image is created for the same captured image and the entire processing is been applied to it. As we can see the slot at which the car has been parked the same slot in the virtual image has been made red [6].
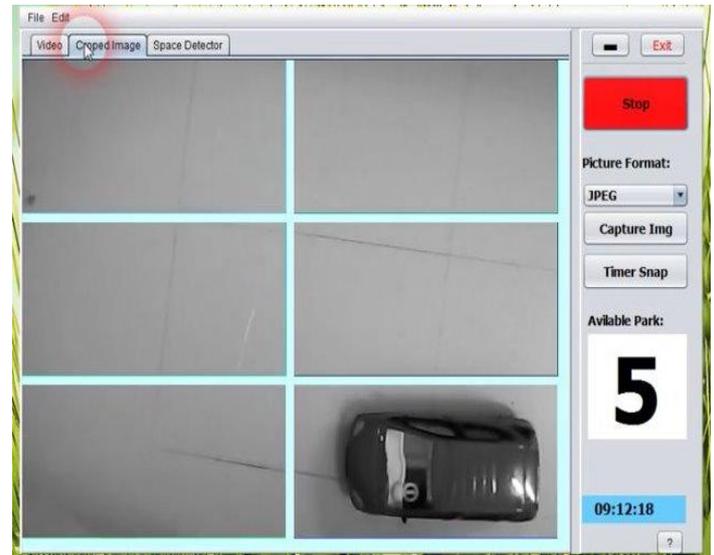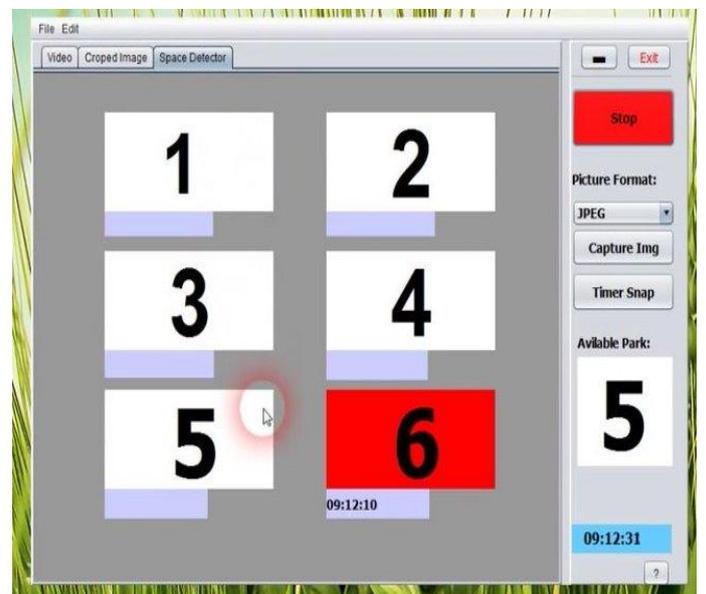

Fig. 3. Parking of car at the lot [7].

Fig. 4.Marking the lot Red having parked car [7].

Flow of the program [8].

1. Load the MATLAB files to the system
2. Define the cascaded file attached within the same directory
3. Load the camera driver to the system and detects the camera presence

4. Each frames of picture are captured frame by frame and read to the system
5. The desired object will be detected based on the cascaded file that has been trained.
6. While the desired object is been detected, the system draws the rectangle surrounding the object in which we are interested, subtracting the background image. This is where background subtraction plays the role.
7. The program shows each frame in an output windows together with the marked object of interest.

SUMMARY

In this paper, we studied about how to track car parking slots in particular areas using image processing algorithms. This system will help to improve parking lot management in urban areas thereby saving people's time and fuel. Reducing collisions, pollution, lost work time, huge traffic jams for drivers searching for free parking lot y will lead increase in social wealth. Future work could fold in real-time video feeds and use vehicle tracking to and from parking spots to help overcome the problem of occlusion. Accordingly, this paper is more of an evaluation of the different individual parking space detection algorithms. However, future work could be applied to using boosting as one possible way of joining the different feature classifiers into one cohesive classification system.

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