Internet of Things (IoT)

IoT based Smart Parking System

Development Part-2

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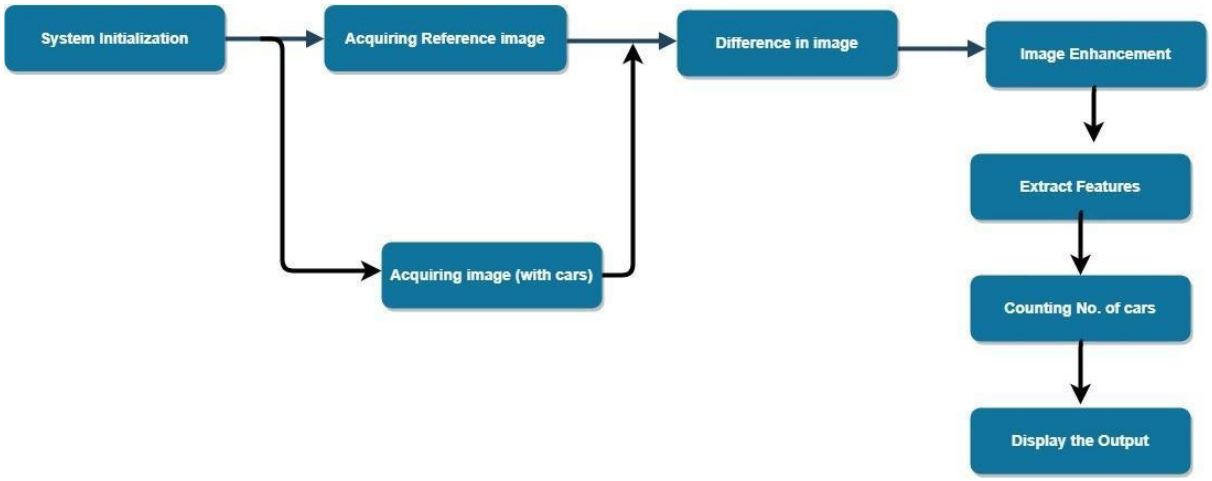
PROPOSED MODEL AND METHODLOGY:

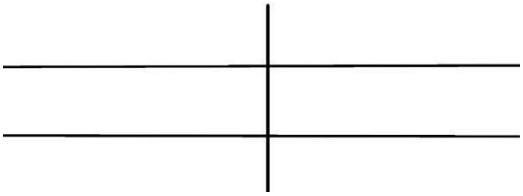
The main flow of the framework . Videos are acquired from the top view of the parking arena with the help of a fixed camera. Video is segmented into frames. Then from each segment a key frame is extracted and further processing is applied on this key frame, to reduce the computational complexity.



FEATURE ENGINEERING:

1) System Initialization:

- In the initial stage, an image is captured by steady CCTV camera at time of installation which is the background reference image. This reference image does not contain any cars. The main purpose is to identify the parking slots in the image. The camera which is used to take the images is fixed at certain position and it faces a fixed direction all the time.



2) Image Acquisition:

- In this step, the picture of parking space containing cars is taken with the help of a high-definition camera.
  The image frame containing six lane image is divided lane-wise.
  The image data is then supplied to the MATLAB software for further processing.

3) Thresholding of image:

- The RGB image acquired is then converted to gray-scale image and then binary image is created in the Image segmentation module. The equation used for the conversion to gray-scale image is Gray= 0.229R+0.587G+0.11B
  The gray scale image of the parking space with cars. From the resulting gray-scale image, binary image is obtained using thresholding technique. The binary image contains all the information about the position and shape of interest. The threshold level is set in such a way that the objects of interest are made into white and the rest of the image black.

4) Image enhancement:

- The binary image contains a lot of noise which is removed using morphological operations and filters such as the Weiner filter. The holes are removed with the help of imfill and bwareaopen function.

5) Image dectition:

- In order to detect the cars, blob analysis is done using predefined functions in MATLAB and the number of cars is counted.

WORKING MODEL:

- This operates under the straightforward tenet of obstacle detection and visual feedback. An infrared transmitter and a receiver make up the proximity sensor, which is fixed to the parking lot ceiling. Infra-red rays are emitted by the IR emitter, and these rays typically reflect off of objects. These rays are picked up by the IR receiver, which transforms them into an electrical signal and a potential difference. The ensuing potential discrepancy aids in closing the circuit. The Light Emitting Diode (LED) is positioned along the driveway and turned on in response to the input the IR sensor receives. In order to fix a certain distance based on the typical height of the cars used to send and then receive the radiations, a threshold distance is calibrated using a potentiometer.

- After putting together every part in accordance with the circuit layout and programming the Arduino board. Now, precisely position the sensors and servo motor. We have four parking slots in this to park our vehicle and we place two IR sensors. IR sensor-1 is placed at the entrance and IR sensor-2 is placed at the exit gates respectively and a servo motor is used to operate the common single entry and exit gate. We can place our LCD display based on our convenient place.

- We used IR sensor 1 to identify whether or not vehicles were coming at the gate and IR sensor 2 to determine whether or not the parking space was unoccupied. The LCD display initially indicates that all parking spaces are unoccupied when they are all empty. The IR sensor-1 detects a vehicle when it approaches the parking area gate, and the system then permits entry into the car by opening the servo barrier. Once a vehicle has entered the parking lot and is parked there, a Light Emitting Diode (LED) display indicates that the specified slot is full. This way, the system permits 4 automobiles automatically.

- The mechanism barred the entrance gate by closing the servo barrier in the event that there is no more room for parking. Additionally, the LED display reveals that slots 1, 2, 3, and 4 are all

taken. The IR sensor-2 identifies the car when it exits a slot and approaches the parking area gate, at which point the system opens the servo barrier. The slot is then empty as indicated by the LED display. Once more, the system will let the entry of a new vehicle.

Evaluation:

Challenges in smart parking:

- For making smart parking we need to improve infrastructure an existing structures will not work.
- There should be combination of technology which needs to be used as single technology will not fil the nod The maintenance co will increase as loT devices will consume power
- Managing the data base of free parking spot is tgh as any other object is present in the spot and sensus will think the parking spot is not free.
- If the system is down due to any error, then there will be lot of trouble to drivers in finding the parking
- The installed equipment will be costly and they can be stolen Sometimes if the driver who has previously booked the slut was little late to move the car from parking alot and someone else might have booked for the same slot then that person will not be able to park the car and it will create a conflict.