Detection of Vehicle Parking Space Using Image Processing in Matlab

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Abstract

An intelligent parking spot recognition system based on image processing technology is what this research intends to propose. The suggested system takes a round picture drawn on a parking area, processes it, and outputs data about the available parking spots for cars.In this project, a camera serves as a sensor to take pictures that display how full parking lots are. A camera is utilised because it can detect the presence of multiple cars simultaneously using an image.To detect various car parking lots, the camera may also be conveniently moved. With the use of this image, it is possible to identify which parking lots are empty, and the processed data is then utilised to direct drivers to vacant lots rather than making them search for them.The suggested system has been created on a hardware and software platform. For both drivers and administrators, an autonomous parking system is employed to simplify and increase the efficiency of the entire parking process.

Index Terms: Parking Space, Image Processing, Image Acquisition, Image Enhancement, Image Segmentation, and Image Detection

I. INTRODUCTION

Having a car is no longer a luxury only afforded to people who work outside the home. Even cars are occasionally purchased with instalment payments. If you ask me, traffic jams caused by a large number of vehicles have become a rather common occurrence in urban areas these days. The role that motors play in our daily lives is also undeniable. When we depart by car, it can be difficult to find a parking space.

The first thing a driver does when entering a specific parking lot is look for a few indicators that indicate whether or not the lot is completely, partially, or completely empty. As well as not

knowing how many parking spaces are available or where to find a parking lot for his automobile, he also has lost track of the number of parking slots. Even when the overall occupancy is good, some parking divisions may continue to be vacant.This leads to inefficient use of parking spaces as well as traffic backups near the parking zone's entrance. Therefore, providing drivers with pertinent information about the parking area as they enter the parking lot becomes a crucial issue.

When a car driver enters a good parking lot, it takes them some time to find a free parking space. With the use of image processing, it is possible to quickly and cheaply solve the problem the motive force is experiencing when counting available parking spaces. The gadget makes use of photo processing to hit upon the life of the automobile and additionally gives records consisting of quantity of to be had parking space. The gadget captures photo the use of webcam and approaches the photo to matter the to be had parking space. For planning, analysis, design, improvement, and testing, the device uses a modified Software Development Life Cycle (SDLC).

In order to apply photo processing strategies to every part of the methodology, this device will be improved. This device provides information on the number of parking spaces that are available. While entering the parking zone, it will benefit all of the drivers. The device uses image processing because the entire area inside the parking lot can be found using only a small number of cameras.Apart from that, the device is small and reasonably priced. A surveillance digital camera is used to take a picture of a car parking area that is placed a few feet up inside the area. This project uses MATLAB as its software platform.

II. RESEARCH ELABORATIONS

Use of Simulation software

Simulink is a simulation and model-primarily based totally layout surroundings for dynamic and embedded systems, included with MATLAB. Simulink is a graphical programming language tool for modelling, simulating, and researching multi-area dynamic systems. Simulink was also developed with the help of MathWorks. It functions primarily as a graphical block diagramming tool with a collection of customisable block libraries.It lets in you to comprise MATLAB algorithms into fashions in addition to export the simulation effects into MATLAB for in addition analysis.

Simulink supports −

system-stage layout

simulation

automated code generation

trying out and verification of embedded system.

III. PROPOSED METHODOLOGY

Block Diagram:

The key component of the framework's go-with-the-drift is demonstrated inside of Fig. With the aid of a set camera, videos are captured from the top-down perspective of the parking lot. Frames are separated out of video. Next, a key body is extracted from each phase, and identical processing is applied to this key body to reduce computing complexity.
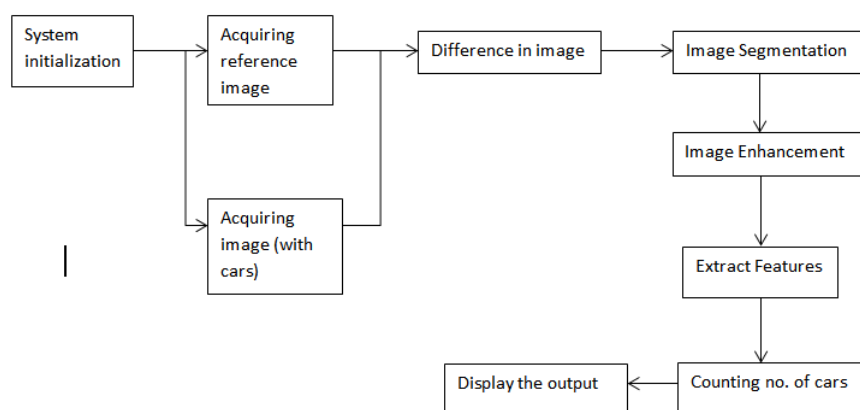
1. SystemInitialization: In the preliminary stage, a picture is captured through consistent CCTV digital digicam at time of set up that's the historical past reference picture. This reference picture does now no longer comprise any cars. The primary cause is to become aware of the parking slots withinside the picture. The digital digicam that's used to take the pictures is constant at a positive role and it faces a set course all of the time.

2. Image Acquisition: With the aid of a high-definition camera, the image of a parking lot with vehicles is eagerly captured in this step.The photograph body containing lane photograph is split lane-wise. The photograph facts are then provided to the MATLAB software program for similarly processing.

3. Thresholding of Image: Once a binary image is created inside the Image segmentation module, the obtained RGB image is converted to a greyscale image. The formula used to convert a picture to greyscale is

$$Gray= 0.229R+0.587G+0.11B$$

The image of the parking lot filled with vehicles in grayscale. By applying the thresholding approach to the resulting greyscale image, a binary image is obtained.The binary picture carries all of the facts approximately the placement and form of hobby. The threshold stage is just about when the hobbyist items are created to be white and the rest of the picture is produced to be black.

4. Image Enhancement: The binary picture carries a whole lot of noise that is eliminated the usage of morphological operations and filters along with the Weiner filter. The holes are eliminated with the assist of imfill and bwareaopen function.

5. Image Detection:In order to hit upon the automobiles, blob evaluation is finished the usage of predefined capabilities in MATLAB and the range of automobiles is counted.

Algorithm:

Step 1: The equipment receives continuous footage from the camera of the car parking place.

**Step 2:**A car pulls into the car parking slot, and pictures are taken.

Step 3: RGB Images are transformed to binary images.

Step 4: The body is cropped lane sensible and taken into consideration sequentially and personally in a loop.

Step 5: Vacant slots with their respective lane is understood through calculating the variety of cars.

Step 6: And then it offers right navigation to the vehicle.

IV. FLOWCHART
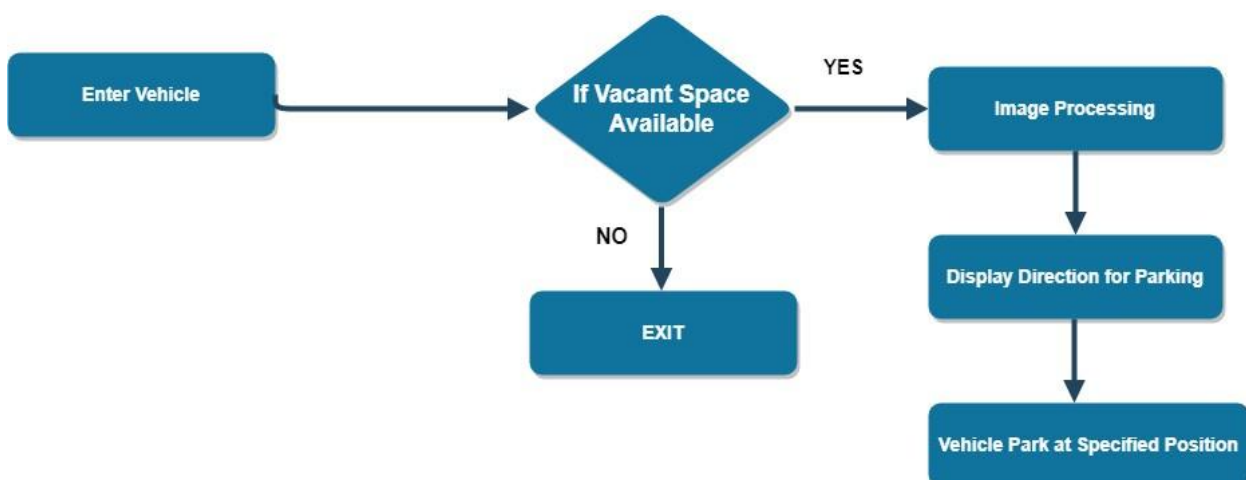
V. RESULTS

a) Command window after execution of code
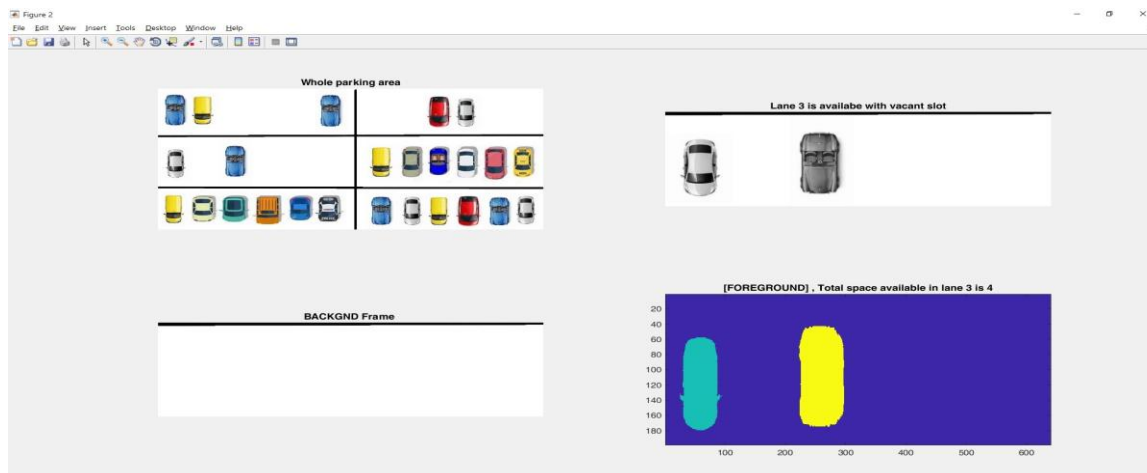
Two output figures after the completionof code execution.
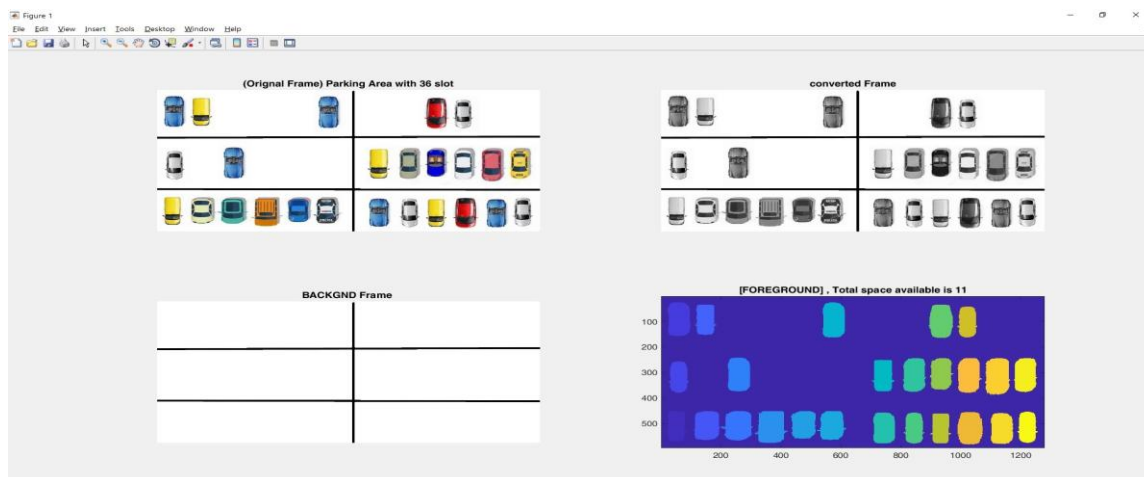
b) Whole parking area observation.

c) Each lane parking area and the vacant lane is observed in the above figure.

VI. CONCLUSION

There are many computerized vehicle parking structures already to be had the usage of technology including GSM, wi-fi transmitter, etc. This task changed into particularly selected for the reason of gaining knowledge of greater approximately picture processing, as it's far one of the maximum applicable technologies of our instances and utilized in several different applications. The parking area detection device was created and tested using MATLAB exclusively for image processing. With just the use of multiple CCTV, a large area may be controlled. It consistently detects approaching automobiles because it uses actual vehicle photos. Due of the simple equipment, it is economically priced and simple to mount. The steering data display on this machine provides drivers with useful real-time parking zone information. Future researchers can be aware of how certain locations are assigned to customers who have already registered with an online parking control system.

VII. ACKNOWLEDGMENT

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