Design and Implementation of Smart Parking Management System Using Image Processing

R.Sureshkumar

Abstract: ***This paper intends to exhibit a framework that consequently identifies the sort of vehicle, guides it, and checks the quantity of vehicles and distinguish the vacant plot number at the parking region. This framework utilizes image processing method. If the vehicle approaches the parking region, the image of the vehicle is caught. In light of the image obtained, the framework distinguishes the vehicle type. The vehicle utilized in this framework are bus, car and bike. Likewise, the image of the parking territory is caught and the framework tallies the quantity of vehicles, the plot number and shows the parking status. If the bus is recognized at the passage, it is coordinated towards west and if car is identified, it is coordinated towards the east and if Bike is distinguished, it is coordinated towards north side of the parking zone in the parking status. This proposed framework can be successfully utilized in the parking zone which includes parking of various sorts of vehicles.***

Keywords: Vehicle location, Vehicle checking, Parking slot recognition, image processing.

I. INTRODUCTION

The individuals are confronting issues to locate an accessible parking spot because they do not have the idea about proper status of the parking area. The significant issue that happens at the parking region is the wastage of time in searching for the accessible parking spots. The drivers continue circumnavigating the stopping territory to locate the vacant space. This likewise causes blockage at the parking region. These issues can be wiped out by offering drivers with the applicable data about the status of the parking garage at the passageway of the parking region. If the status of the parking slot is shown at the passageway, the drivers can easily know the accessibility of the parking garages and can stop their vehicles accordingly.

In the event that if there is no accessibility of parking spot and also the drivers can move away from the parking region immediately. Additionally, the kind of the vehicle encourages the drivers to stop the vehicles in the predetermined area. This is extremely helpful in the parking zones which includes the parking of various sorts of vehicles.

II. PROPOSED METHODOLOGY

The proposed framework includes 2 modules: Simulation part and the Hardware module. Simulation part includes the Vehicle recognition and heading module and Slot number identification module. The vehicle identification and bearing module is utilized for the recognition and the course of the vehicles.

This includes the Image Acquisition, Binary Image Processing, Area Calculation and Vehicle course [1]. The Slot Number Identification module is utilized for checking the quantity of vehicles and distinguishing the individual space number in the parking region. The general module is shown in Fig.1 and Fig.2

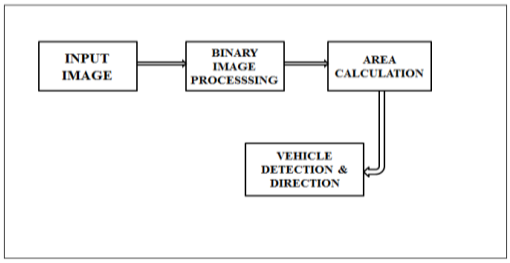

Fig 1 Vehicle identification & guiding module

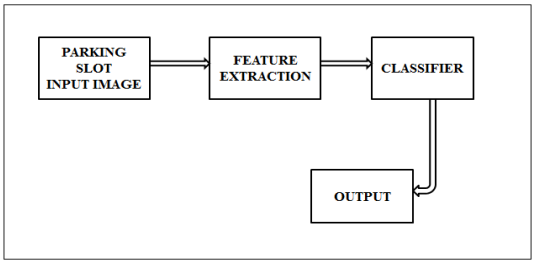

Fig 2 Parking Slot number indication module

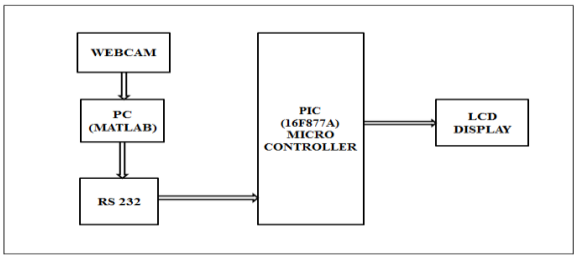

Fig 3: System block diagram

A. Vehicle identification and guiding module

a. Image Acquisition

This module includes capturing and storing of the information pictures and these are utilized for the identification of the vehicle type.

Revised Manuscript Received on December 08, 2018.

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Fig 4 Captured Image of Bus

Fig 5 Captured Image of Car

Fig 6 Captured Image of Bike

b. Binary Image Processing

The Matlab code utilized for image compression is given in the eqn.1.

I3 = imresize(I,[256 256]); (1)

Gray = 0.226R1+0.81G1+0.11C2; (2)

k = RGB2GRAY(I3); (3)

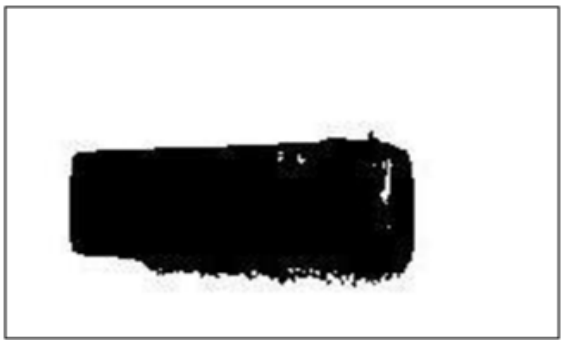

Fig 7 Gray Scale Image of Bus

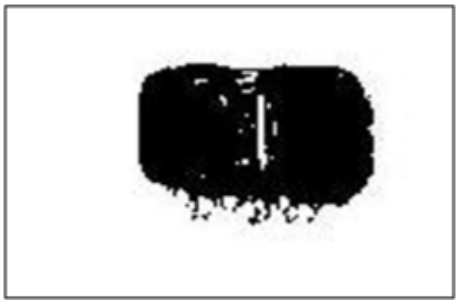

Fig 8 Gray Scale Image of Car

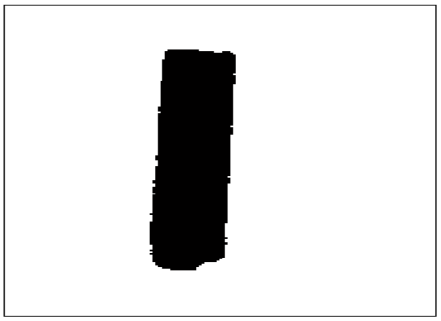

Fig 9 Gray Scale Image of Bike

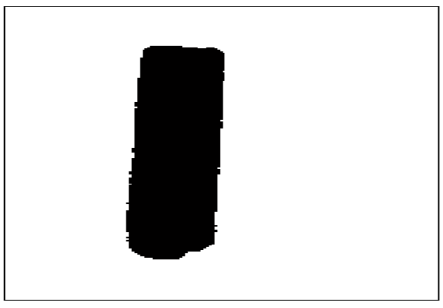

Fig 10 Enhanced Image of Bike

c. Calculation of area

Based on the area, the type of vehicle is identified. To decide the kind of the vehicle, the white zones of the pictures are ascertained. In view of the estimations of the area calculation, the image is distinguished as Car, Bus or Two-Wheeler[4].

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Fig 11 Parking Lot with No Vehicle

Fig 12 Parking Lots with Vehicle

B.Slot number identification module

To build up this framework, a model of the parking area has been composed. This model comprises of 6 stopping lots;2 parking areas to stop the autos on the east side, 2 parking garages to stop the transport on the west side and 2 parking garages to stop the bike on the north side. The example pictures of the planned parking garage are appeared beneath in the Fig.12 and Fig.13.

a. Feature Extraction

The relevant information from the input data are extracted from the feature set to execute specific task. So that reduced representation is sufficient instead of full size input.

b. Classification Using ANN

Neural systems are great when managing conceptual issues, similar to those based on patterns and features. This feature is named as associative recall.

[net2] = train(net2,T,x); (5)

III. 16F877 PIC MICROCONTROLLER

The 16F877 PIC Microcontroller is manufactured in CMOS technology. It utilizes individual buses for data and program memory. The chip size is very small in nature. It has Reduced instruction set computing architecture. The Flash Technology is utilized in PIC16F877.Various microcontrollers offer various types of recollections such as EEPROM, EPROM, FLASH. Innovation that is utilized in PIC16F877 is when the power is turned off, the stored data is not erased.

IV. RESULTS

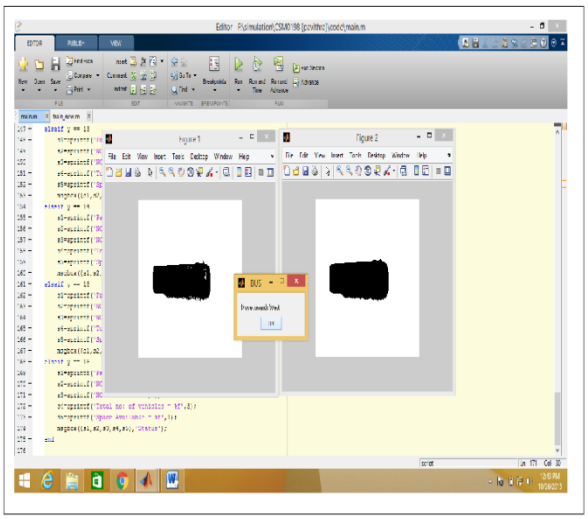

Fig 13 Simulation result to direct Bus

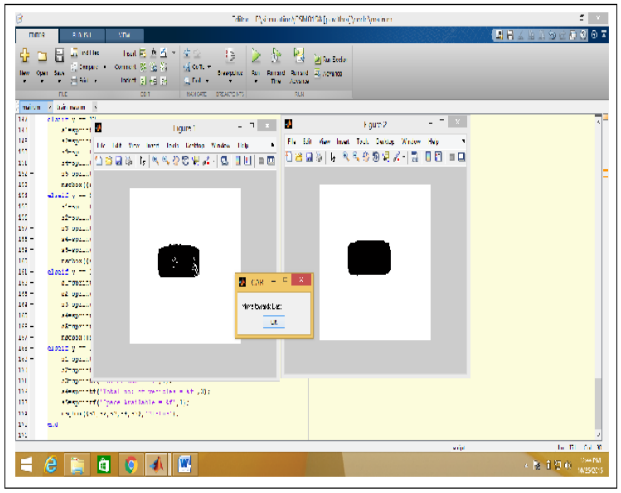

Fig 14 Simulation result to direct Car

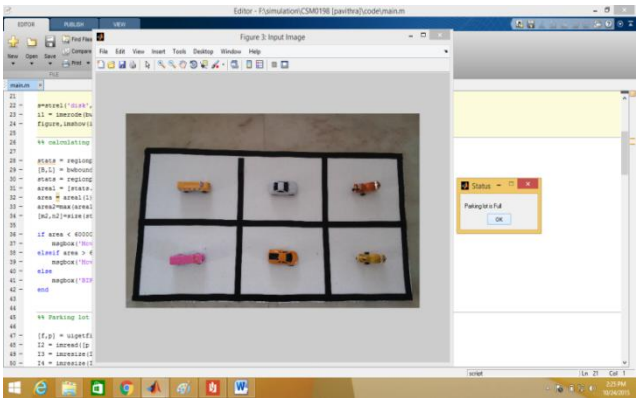

Fig 15 Simulation output when parking area has vehicles

V. CONCLUSION

The smart parking management system consumes less amount of time for searching empty parking slot. By

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analyzing the images, kind of vehicle is identified. From the information gathered from stopping accessibility, the vehicles are coordinated to the predefined way The automatic payment module is incorporated in the future expansion of the system.

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