SMART PARKING USING OPEN CV

B.V. Chowdary
Head of the Department
Department of Information Technology
Vignan Institute of Technology and Science
Hyderabad, India
bvchowdary2003@gmail.com

Thota Tejeswar
UG Scholar
Department of Information Technology
Vignan Institute of Technology and Science
Hyderabad, India
thotatejeswar5@gmail.com

Vennela Reddy Vaddepally
UG Scholar
Department of Information Technology
Vignan Institute of Technology and Science
Hyderabad, India
v.vennelareddy09@gmail.com

Amaragani Pranay
UG Scholar
Department of Information Technology
Vignan Institute of Technology and Science
Hyderabad, India
amaraganip@gmail.com

Amireddy Koushik Reddy
UG Scholar
Department of Information Technology
Vignan Institute of Technology and Science
Hyderabad, India
saketh.amireddy@gmail.com

I. ABSTRACT

Nowadays, finding a parking spot in urban cities is getting more and harder as the number of cars increases. So, in order to lessen rush hour traffic in parking spaces, an effective car parking occupancy monitoring system is becoming a necessity. This work offers a system that can determine if a parking place is filled or not using aerial photos taken by a camera, based on algorithms that use computer vision and fundamental image processing techniques. It attempts to address the problem of parking spot detection by reducing the amount of time spent exploring parking lots, which in turn lowers carbon emissions and improves quality of life. Hardware devices, sensors, the Internet of Things, the CNN network, and multiple deep learning algorithms are currently used as solutions to this issue. However, the suggested solution does away with all of the aforementioned complexity, which significantly reduces costs.

II.INTRODUCTION

Numerous worries have been raised by the increasing population in urban and semi-urban areas due to the incredibly expanding job opportunities and glitzy lifestyle. As an illustration, the increasing number of commuter vehicles, particularly cars, has a direct impact on the city's parking lots, which have historically been few. People are purchasing automobiles despite being aware that they do not have a suitable location for them. As a result, they park their vehicles on public streets, which is typically done carelessly in the country as we do not yet have designated parking metres. This causes a blockage for other drivers and disrupts the flow of traffic. An individual spends a median of 20 minutes every day looking for a place to park in cities like Bangalore and Delhi. This worry has prompted us to consider a method whereby locating a parking place may be made simpler utilising cutting-edge technology, thereby cutting down on the amount of time needed to hunt for a space.

These days, finding a parking spot in the lot is a big problem that cannot be ignored because so much time and energy is lost by drivers. The number of privately owned vehicles is growing along with population growth day by day, yet for a variety of reasons, the number

of spaces available in a parking lot frequently stays the same. There may occasionally be an open spot in the parking lot, but the driver in the car cannot always tell where the space is exactly. The parking place may be hidden by some object or be far from the car, which could be the cause of that. Previously, or possibly still today at some parking lots, there was a person in charge of managing the parking spaces. However, this person did not have access to information about the location of vacant spaces; instead, they only knew the total number of vacant spaces. As a result, drivers had to look around the parking lot and look for vacant spaces while other drivers arrived, which resulted in numerous losses in terms of time, fuel, and even temper. Therefore, to address these problems, researchers have created parking lot identification systems that use devices like video sensor and camera systems to recognise when a parking space is available or occupied. In order to cover the entire parking lot, this system can be primarily applied in outdoor parking lots. Parking lots at restaurants, universities, and retail centres are similar to parking lots outdoors. By being aware of vacant and occupied parking spaces, this can be used in real-time applications that also help to reduce traffic, pollution, and parking lot lines.

The main goal of this system is to create a model that can quickly determine whether a parking space is empty or occupied in images and videos using OpenCV object detection, as well as to determine whether a car parking lot is full or empty in images and videos using the OpenCV detector, which is portrayed by interconnecting the output in OpenCV, and to gather high-quality training data.

III. LITERATURE SURVEY

Literature Review **[1]** In this paper, the design and construction of a smart parking lot surveillance system are described. It combines wireless network technology with image processing techniques for vehicle detection. Following are the three key elements of the efficient parking system suggested in this study. The information delivery notification system, a WLAN-integrated area base station, and Wi-Fi access points (APs) dispersed across each major parking facility sector make up the parking detecting nodes.

[2] Platform/Server, PIC controller, and IR Sensor are a few of the parts used in the smart parking system in this article. The platform/server keeps track of and performs all system-related operations while also looking for issues. As an intermediary device, the PIC controller gathers sensor data and transmits it to the server. The IR Sensor is a tool used to detect open parking spaces by sending a signal whenever a car pulls into or out of a space.

[3] In a three-phase process, a theory for finding an empty site is presented in this study. In the first stage, a parking zone-installed Arduino sensor communicates with available space and the user. The cloud is present in the second phase. The user side constitutes the third step. Every parking space has an IoT sensor made by Arduino that connects to a mobile device through wi-fi.

[4] Using cameras, the gadget scans both the person and the vehicle. The vehicle licence plate is scanned using an optical character recognition algorithm, and the face is scanned using a face recognition algorithm. IoT devices are utilised to open a parking spot's gate. We'll start the database-building process with shots of every individual taken from a variety of angles, as shown below, to ensure that shots acquired from any position will produce the same results. Safety is improved because no intrusions are permitted. The alarm will produce a sound if someone enters the building or the car is parked improperly. The suggested response ensures that everything will happen automatically and that accuracy won't suffer due to time restraints.

[5] The technique utilised in this study uses colour histogram classification and car feature point identification to stutter on empty parking spaces in static overhead photos. It consists of four stages: the extraction of parking area sections that have been manually labelled, pre-processing, colour histogram classification, vehicle feature recognition, and blending the results to get the final classification.

[6] GPS-based parking space reservations have been made utilising wireless communication. The approach broadcasts the availability of areas every 120 seconds. No moves are recorded if all parking lots are inaccessible; alternatively, any user is prepared to contact a site that is two kilometres away from where they are right now.

IV. PROPOSED SYSTEM

In the proposed method this would like to present a robust detection algorithm based on the deep learning techniques with good accuracy. The proposed method detects a car occupancy in the parking lot in an image and in the video by training the model with the data of the parking lot created. This shows that the convolutional neural networks work will have a success rate close tothe traditional methods used in the past. The system will be able to detect the car occupancy in theparking lot according to the camera direction when the camera is installed by the user. In this the images are collected from the surveillance camera in different angles of the parking lot so that themodel can detect the car in different angles. The data for this is collected form five parking lots from the institute for better results. As mentioned earlier there are some disadvantages included inthis vision-based system, the detection in this is more accurate and the advantages far outweighs its disadvantages.

V. SYSTEM ARCHITECTURE

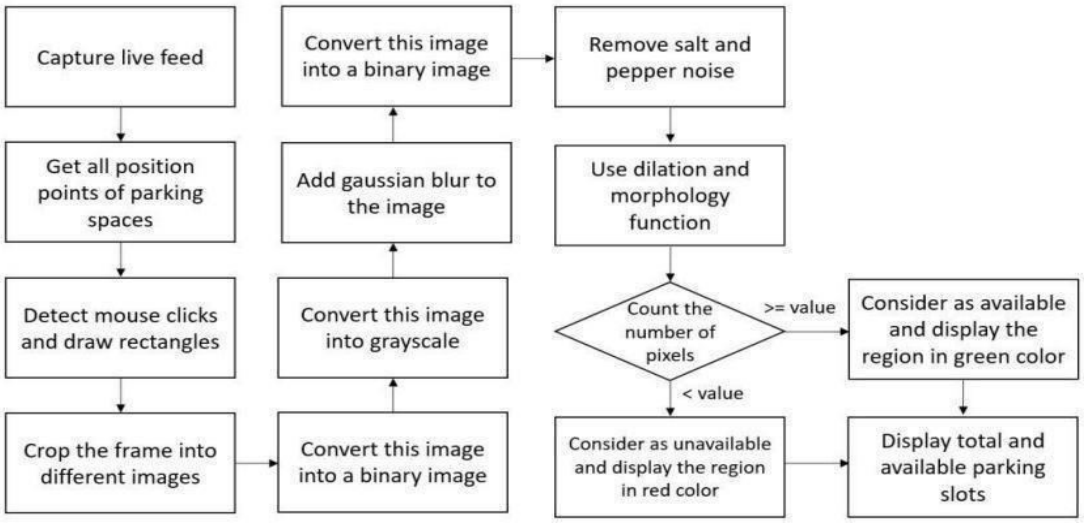

Fig 1: System Architecture

VI. WORKING

The camera serves as a real-time input for the proposed system in this paper. The live feed is usedto get all the position points of parking spaces. The regions of interest are selected by mouse clicks.For the purpose of detecting a car, the entire frame is cropped into different images one by one. The single image is converted into a binary image because binary images can easily separate objects from the background. The segmentation process helps label each pixel as a "background"or "object" and assign a black and white color accordingly. The image is then converted into grayscale to do adaptive thresholding. Adaptive thresholding is a method of calculating thresholdsfor smaller areas. Gaussian blur is added to the image to reduce image noise. The image is then again converted into binary. Then a medium blur is applied to the image. This could be very powerful towards salt and pepper noise in the images. The image is then dilated to develop the foreground pixels. Finally, the range of pixels is counted. If the number of pixels is less than a particularly decided value, then that region is considered unavailable and if it is more than the particularly decided value, then that region is considered available. The total and available parkingspaces are then displayed on the screen.

Fig 2 : User Input

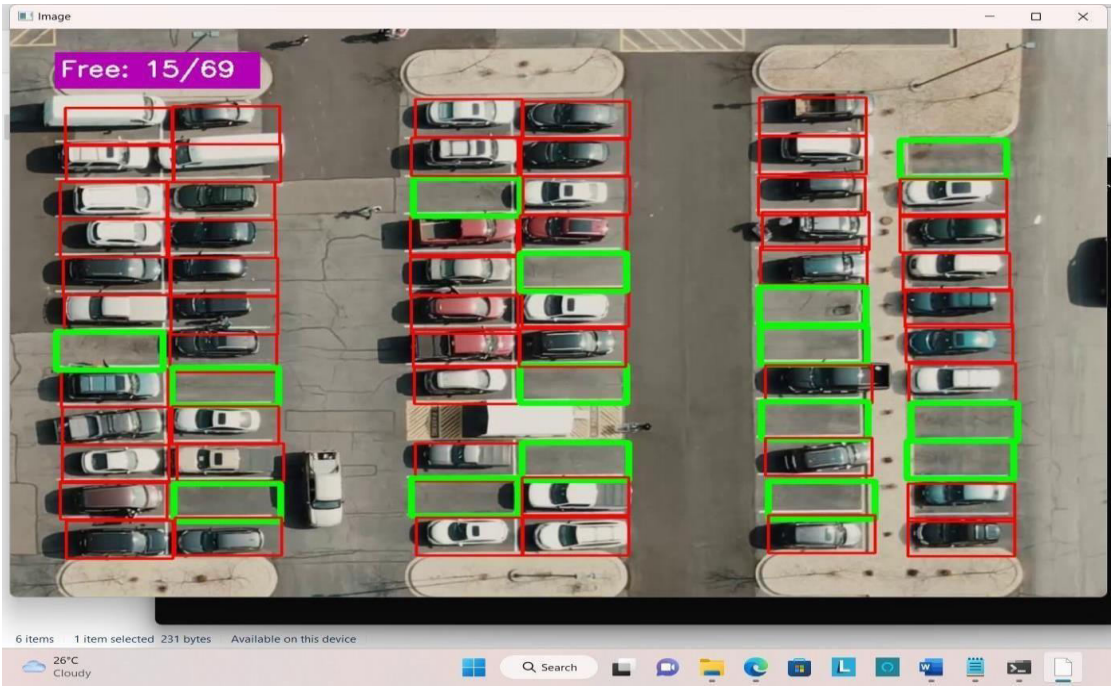

Fig 3 : Output

VII. CONCLUSION

There are various methods today which can guide us to make a full functioning system to find parking space for your vehicle. Our approach also was one such where we used a live video feed as our main input and used the most efficient image processing techniques using OpenCV, Pythonand computer vision algorithms to create an interface which can effectively identify vacant/occupied spaces. The POC is ready to implement using hardware devices like a camera anda mobile interface for android/ios devices facilitated by cloud infrastructure.

VIII. ACKNOWLEDGEMENT

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IX. REFERENCES

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