

Intelligent Vehicle Parking Lot Locator

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Abstract: - Intelligent Vehicle Parking lot Locator (IVPL) is the smart parking lot locating system proposed using Image processing Technology in MATLAB. The system takes vehicle number plate information as input in the front end interface and shows the location of vehicle in the parking lot to help the driver to know the parked location. As a rising usage of smart parking system, cameras are installed in parking lots for surveillance and occupancy detection. Still images and streaming videos of the parked vehicles are taken as input. The number plate details of these taken car images are extracted by License Plate Recognition (LPR) technique. To identify the parking location of a particular car, the proposed IVPL will map the number plate details of that car given by the driver with the output of LPR. As a result it will display the required parked car image with the confirmation message to the driver so as he can reach his vehicle easily. The Key benefit of IVPL is to save the precious time-especially in airports, train station, shopping mall etc where the parking area is very large and to eliminate any stress and frustration caused when looking for the unknown parked location.

Keywords: Intelligent Vehicle Parking lot Locator (IVPL), License Plate Recognition (LPR), Smart Parking System, MATLAB.

I. INTRODUCTION

The size of parking lots is big in many places like shopping malls, airports, railway stations, etc. Often the vehicle owner may forget or confused with his vehicles parking location. Many people can tell stories of losing their vehicle in parking lots: searching up and down the wrong aisle, sometimes the wrong floor or even the wrong garage. "More than half of drivers have forgotten where they've parked, making it the No. 1 driving embarrassment." A dedicated survey by USA based Insurance.com reveals this statement [1]. Nowadays smart parking systems are used for occupancy detection, parking charge collections, and related parking management facilities. This "Intelligent Vehicle Parking lot Locator" will have add-on feature shall take the smart parking system into next level of benefits. It will put an end card to the "driver's symptom of misplaced vehicle". In this research paper, a smart Intelligent Vehicle Parking lot Locator (IVPL) system using Image processing Technology is proposed. The paper is organized as follows. Section II presents the survey of various license plate recognition and algorithms; Section III presents the system process how it works is explained in the flow chart; Section IV how to identify the car in parking area explain with images in system frame work; Section V In System Description briefly describe the overall process and get results; Section VI Listed out merits and demerits and finally presenting the conclusion.

II. LITERATURE REVIEW

In the literature, various license plate detection algorithms are implemented and proposed, yet license plate capturing has been studied for several years, and is a challenging task to track license plates from several angles, partial occlusion, or multiple instances. Chetan Sharma and Amandeep Kaur proposed the Pre-processing of Image by histogram equalization, Extraction of plate region by edge detection algorithm (canny operator) and Plate Area Detection by various morphological operations; Segmentation of characters by connected component, bounding box method, and Median filter. Observed final result as Extraction: 71/78 which gives 91.02% efficiency, Segmentation: 69/78 which gives 88.46% efficiency. Overall Accuracy of our system is 89.74%. The limitation is that the proposed method is sensitive to the angle of view, physical appearance and environment conditions [2]. Kumar P proposed edge detection algorithm and vertical projection methods for extracting the Plate region. In segmentation part filtering, thinning and vertical and horizontal projection are used. And finally, chain code concept with different parameter is used for recognition of the characters. Work results final system with Efficiency of 98%. It has limitations as this method is mainly designed for real-time Malaysian license plate [3]. Muhammad H Dashtban, Zahra Dashtban and Hassan Bevrani, proposed a technique which involves three approaches in plate localization, Noise alleviation, Changing colour space, Intensity dynamic range modification, Edge detection, Separating objects from background, Finding connected component, Candidate

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selection: in segmentation part multistage models are used; for the recognition artificial Feed forward neural network is used. According to the work results, the method achieves accuracy over 91% for localizing plates. It has a limitation of detecting only English and Parisian number plates [4].

R. T. Lee, K. C. Hung and H. S. Wang, given all three processes by 2D Haar after that discrete wavelet Transform technique is proposed that will Locate and extract the license-plate, train the license-plate, provide real time scan and recognize of the license-plate. The Results of Recognition rate yields the efficiency of 93.0%. Advantage of this approach is Haar Discrete Wavelet Transform which requires time transform of 1/4 of the original image. Hence, this method can have fast execution speed. Disadvantage only specified cameras can be used like CASIO EXILIM, 10.1 MEGA PIXELS DIGITAL CAMERA EX-S10 by adjusting the resolution to 480 x 640 for photography vehicle license plates [5].

Suri Dr. P.K and Verma Er. Proposed Edge Detection(Sobel Edge Detection) technique and then filtering of noise by Median Filter, Smoothing, Connector, Masking and then Colour Conversation is done. The limitation what we can see is that the detection is not that much clear and proper, which we find, is due to improper light segment or varying illumination effects [6].

Ozbay,S, and Ercelebi,E, proposed Extraction of plate region using edge detection and smearing algorithms. Segmentation of Characters: smearing algorithms, filtering and some morphological algorithms; recognition of plate characters: template matching. It results, extraction of plate region: 97.6% segmentation of the characters: 96%, recognition unit: 98.8%.overall system performance: 92.57% recognition rate. It is having some limitations like recognition of car license plate only, and this system is designed for the identification of Turkish license plates [7].

Stuti Asthana, Niresh Sharma and Rajdeep Singh, developed a technique for Number plate recognition which includes neural network and MLP algorithm followed by matrix mapping. Training by this approach obtained 96.53% average recognition rate using double hidden layer and 94% using single hidden layer. The limitation is that the captured images will be within 2-3 meters [8].

Kuldeepak, Monika kaushik and Munish Vashishath, proposed number plate recognition technique when streets are occupied with huge number of vehicles passing through it. In this paper, by optimizing different parameters, they have accomplished an exactness of 98%.

It is essential that for the tracking stolen vehicles and monitoring of vehicles of an exactness of 100% can't be bargained with. Therefore to accomplish better precision, streamlining is required. Additionally, the issues like stains, blurred regions, smudges with various texts style and sizes ought to be remembered. This work can be further boundless to minimize the errors because of them [9].

Amar Badr Mohamed M., Abdelwahab, Ahmed M. Thabet, and Ahmed M.Abdelsadek proposed Automatic Number Plate Recognition (ANPR) method that catches the vehicle image and confirmed its license number. ANPR can be used in the presentation of stolen vehicles [10].

Chittode J S., developed an algorithm which is applied on the car park systems to monitor and manage parking services. Algorithm is developed on the basis of morphological operations and used for number plate recognition. Optical character is used for the recognition of characters in number plate [11].

Paunwala C.N developed a methodology which finds ROI using morphological processing and directional segmentation. The ROI is the area which includes the number plate from which alphanumeric characters are recognized. This method is tested on different databases of vehicle images [12].

Ankur kr Aggarwal and Aman Kr Aggarwal, developed a system based on digital images and can be easily applied to commercial areas based on a smart and simple algorithm for vehicles registration plate recognition system. The percentage of accuracy of the recognition is 97% [13].

III. SYSTEM PROCESS

The "Intelligent Vehicle Parking lot Locator (IVPL)" is a new feature of vehicle searching based on Image Technology. The camera installed in a parking lot shall capture many vehicles at once in a specific parking lot making them efficient and cost effective. In this way, required number of cameras shall be installed in several locations of big parking lots to cover all its parking spaces. The captured images are processed to recognize the license plate. Once the driver input his vehicle license plate number in the front end interface, the vehicle searching algorithm shall locate the vehicle and displays the particular parking lot image with his parked vehicle for the confirmation. The resulted image and parking lot

number/identification shall help the driver to locate and to reach his/her parked vehicle.

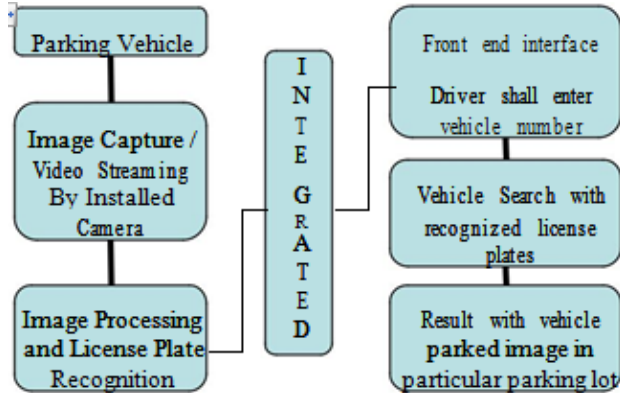
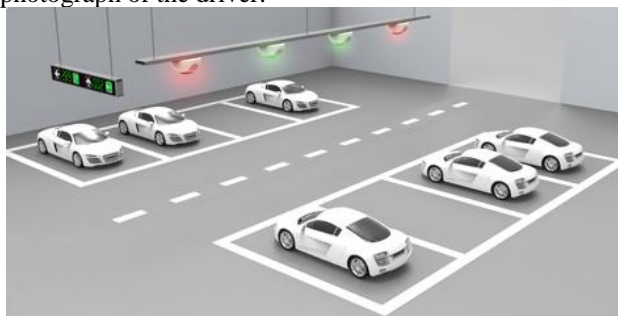


Fig. 1 Intelligent Vehicle Parking lot Locator – Process

IV. SYSTEM FRAME WORK

Smart Parking systems typically obtains information about available parking spaces in a particular geographic area and process is real-time to place vehicles at available positions .It involves using low-cost sensors, real-time data collection, that allow people to reserve parking in advance or very accurately predict where they will likely to find a spot. Smart Parking technology is about enhancing the productivity levels and the service levels in operations. Some of the underlying benefits could be lowering operating costs, while building value for customer to drive occupancy, revenues and facility value. OCR (Optical Character Recognition) is used to translate the image handwritten characters into machine editable format. OCR reads damaged or low-quality codes and returns the best quality to the system. Automatic number-plate recognition (ANPR) technology uses optical character recognition on images to read vehicle registration plate to create vehicle location data. Automatic number plate recognition can be used to store the images captured by the cameras as well as the text from the license plate, with some configurable to store a photograph of the driver.



The overall frame work is shown in following sections

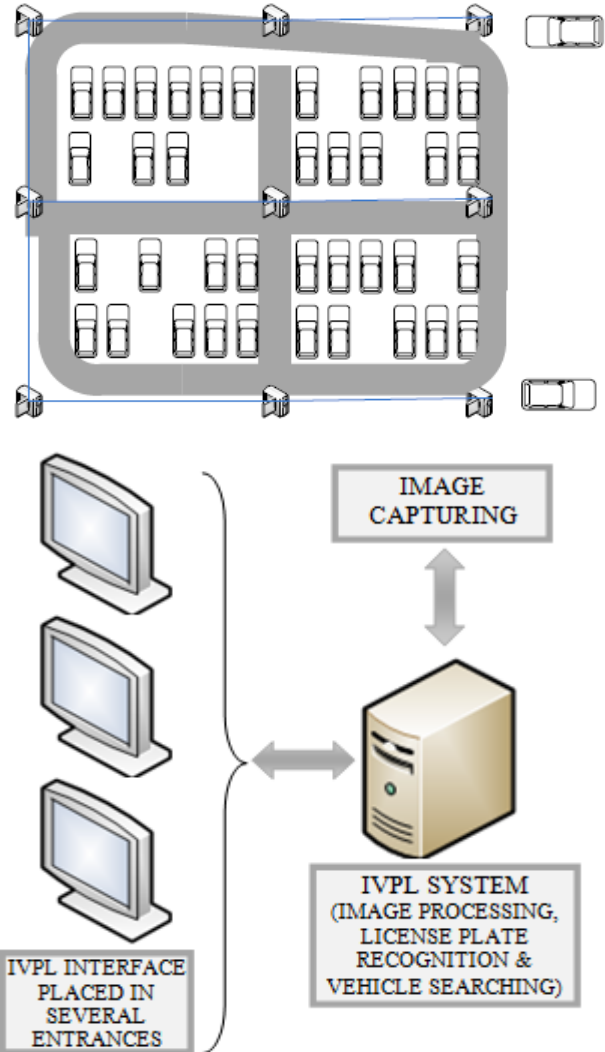


Fig. 2. Intelligent Vehicle Parking lot Locator (IVPL) – Frame Work

V. SYSTEM DESCRIPTION

A. Overview

Intelligent Vehicle Parking lot Locator system shall utilize the parking lot cameras for image capturing. When image is captured, the license plate shall be detected using MATLAB based “License Plate Recognition” by image processing. Once Driver enters the license plate details in front end interface, IVPL system shall search and locate the entered license plate vehicle.

B. Image Capturing

Parking Lots shall have several cameras installed for smart parking management. Each camera shall be capable to cover three to six parking slots in a parking lot. When a

car parked / removed from parking, the image capturing of the particular slot shall be updated.



Fig. 3 Typically captured image

C. License Plate Recognition

Ms. Shilpi Chauhan and Vishal Srivastava, ragini bhat1, and bijender mehandia, proposed a technique which may detect and recognize the license plate details [14] [15].



[17]



[16]

Fig. 4 Example LPR

D. IVPL Front End Interface

The user friendly front end interface is designed to use touch screens with keyboard to enter license plate details. Once License Plate detail is entered, the driver shall confirm to proceed vehicle searching by IVPL.



Fig. 5 Typical IVPL Screen Snap – License Plate Entry

E. Vehicle Searching

Once the License Plate detail is confirmed, the IVPL shall start searching for the vehicle by comparing the recognized license plates in all parking spaces. Once the comparison is matched with any captured image’s license plate, the IVPL system shall display the parked car image with confirmation message.



Fig. 6 Typical IVL Screen Snap – IVL Result

VI. MERITS AND DEMERITS

A. Merits

- This system saves precious time of drivers looking for the unknown parked location.
- System can be used and applied anywhere due to ease of usage.
- This system shall be used as add-on to existing smart parking management systems.
- This System shall provide enhanced user experience.
- This system shall provide increased service and brand image by means of providing seamless experience.
- Drivers will surely be impressed with the cutting edge technology and convenience factors.

B. Demerit

As most of the automatic number plate detection has the disadvantage of detecting the numbers while plate is so dirty or having modified format or paints are faded, this system may not provide correct result.

V. CONCLUSION

Spending much time by drivers to search for their vehicle in parking lot is very normal in routine life. In this paper, an “Intelligent Vehicle Parking lot Locator” system based on image processing is presented which shall help drivers to locate their vehicle within shortest time. This IVPL will then locate the vehicle, take photo of it and display on the System so the driver can confirm it is indeed their car that is being located. The Key benefit of IVPL is it saves

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precious time-especially in airports, train station, shopping mall etc. This system shall eliminate stress and frustration when looking for the unknown parked location. This system can further be extended to identify illegal parking, theft vehicle parking detection, parking lot occupancy detection, detecting vehicle without number plate, etc

REFERENCES

- [1] By Insurance.com: Biggest driving embarrassments: Forgetting where one parked and driving over curbs, May 11, 2014.
- [2] Chetan Sharma and Amandeep Kaur (2011), "Indian Vehicle License Plate Extraction and Segmentation", International Journal of Computer Science and Communication, Vol. 2, No. 2, pp. 593-599.
- [3] Kumar P, Member, IEEE and Kumar.P.V (2010), "An Efficient Method for Indian Vehicle License Plate Extraction and Character Segmentation", IEEE International Conference on Computational Intelligence and Computing Research.
- [4] Muhammad H Dashtban, Zahra Dashtban, Hassan Bevrani (2011), "A Novel Approach for Vehicle License Plate Localization and Recognition", International Journal of Computer Applications (0975 – 8887), Volume 26–No.11
- [5] R. T. Lee, K. C. Hung and H. S. Wang(2012), "Real Time Vehicle License Plate Recognition Based on 2D Haar Discrete Wavelet Transform", International Journal of Scientific & Engineering Research, Volume 3, Issue 4, ISSN 2229-5518.
- [6] Suri. Dr. P.K, Verma Er. A (2010), "Vehicle Number Plate Detection using Sobel Edge Detection Technique", International Journal of Computer Science and Technology, ISSN: 2229 – 4333, IJCST Vol. 1, Issue 2.
- [7] Ozbay.S, and Ercelebi.E (2005), "Automatic Vehicle Identification by Plate Recognition", Processing of world academy of science engineering and technology vol9, ISSN 1307-6884.
- [8] Stuti Asthana, Niresh Sharma, Rajdeep Singh (2011), "Vehicle number plate recognition using multiple layer back propagation neural networks", International Journal of Computer Technology and Electronics Engineering (IJCTEE), Volume 1, Issue 1.
- [9] Kuldeepak, Monika kaushik and Munish Vashishath (2012), "License Plate Recognition System based on Image Processing Using Lab view" International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 2 Issue 4 (July 2012).
- [10] Amar Badr Mohamed M. Abdelwahab, Ahmed M. Thabet, and Ahmed M.Abdelsadek,"Automatic Number Plate Recognition system", Annals of the University of Craiova, Mathematics and Computer Science Series Volume 38(1), 2011, Pages 62{71ISSN: 1223-6934.
- [11] J.S. Chittode and R. Kate, "Number plate recognition using segmentation," International Journal of Engineering Research & Technology, Vol. 1 Issue 9, November- 2012.
- [12] C N Paunwala and S Patnaik,"A novel multiple license plate extraction technique for complex background in Indian traffic conditions," International Journal of Image processing, Vol-4, Issue-2, pp 106-118.
- [13] Ankur Kr Aggarwal, Aman Kr Aggarwal, "Vehicle Registration Plate Recognition System Based on Edge Transition by Row and Column Profile on Still Image", International Journal of Engineering Research & Technology (IJERT) Vol. 2 Issue 1, January- 2013 ISSN: 2278-0181, pp. 1-8
- [14] MATLAB Based Vehicle Number Plate Recognition, Ms. Shilpi Chauhan and Vishal Srivastava, International Journal of Computational Intelligence Research ISSN 0973-1873 Volume 13, Number 9 (2017), pp. 2283-2288.
- [15] Recognition of vehicle number Plate using MATLAB, ragini bhat1, bijender mehandia, international journal of innovative research in electrical, electronics, instrumentation and control engineering, Vol. 2, issue 8, august 2014, p, 1899-1903
- [16] Automatic License Plate Based Smart Vehicle Validation &Security by Gate Control & Email Send, Rinky Sharma, International Journal of Computer Science and Information Technologies, Vol.6(2),2015,952-957.
- [17] Multiple License Plate Detection Algorithm, Maitree Bhavsar, Dr. Heena Kher, International Journal Of Darshan Institute On Engineering Research & Emerging Technologies, Vol. 3, No. 2, 2014, pp.01-06
- [18] Color, Scale, and Rotation Independent Multiple License Plates Detection in Videos and Still Images, Narasimha Reddy Soora and Parag S. Deshpande, Hindawi Publishing Corporation Mathematical Problems

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in Engineering Volume 2016, Article ID 9306282, 14
pages <http://dx.doi.org/10.1155/2016/9306282>.

[19] Automatic Vehicle Number Plate Recognition for Vehicle Parking Management System, Ganesh R. Jadhav , Kailash J. Karande, Computer Engineering and Intelligent Systems ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online) Vol.5, No.11, 2014,

[20] License Plate Recognition from Still Images and Video Sequences: A Survey, Christos-Nikolaos E. Anagnostopoulos, IEEE transactions on intelligent transportation systems, Vol. 9, no. 3, September 2008. P 377-391.

[21] <https://www.insurance.com/press-room/biggest-driving-embarrassment>.

[22] www.iiste.org .

