

VEHICLE PARKING MANAGEMENT USING IMAGE PROCESSING

¹Sivabalan V, ²Srihari T.K

¹Student, ²Student

¹Department of Electrical and Electronics Engineering

¹SRM Institute of Science and Technology, Chennai, India

Abstract: *In today's scenario, the parking of vehicles seemed to be a burden due to drastic increase in population especially in a country like India. In this paper we have proposed an idea where the parking problem in our country can be managed using image processing. Through image processing we'll be detecting free spaces in the parking lot and specify the slots to a system. The proposed process is implemented in Matlab using image processing technique.*

Keywords - Image processing, Matlab, Parking System.

I. INTRODUCTION

Back in those days, individuals utilize the open method of transportation as Bus and Train for moving starting with one spot then onto the next. Be that as it may because of Globalization the general population move from rustic zone to urban regions for work and different needs the Individual transportation have been improved a ton for their straightforwardness. Owing to these expansions in vehicle the leaving turns out to be much entangled and the general population can stop them on the either sides of the streets results in substantial rush hour gridlock. At present there is no orderly methodology in stopping framework. The manual control can be actualized in a few regions yet it is no so solid to fulfil the present number of vehicles. The quantity of vehicles is more than the quantity of parking lots. The organization have actualized numerous methods to guarantee the ease of traffic at vehicle leaving zones. With families getting smaller and the total number of motor vehicles exceeding the total number of heads per family, the parking scenario is woefully falling short of the current requirements in the country. The situation is such that on any given working day approximately 40% of the roads in urban India are taken up for just parking the cars. The problem has been further exacerbated by the fact that nowadays even people from low income group are able to own cars. The number of families with cars has become much more than what the country is able to manage. As it is, the cities in India are highly congested and on top of that the parked cars claim a lot of space that could otherwise be used in a better way. Thanks to poor, and at times zero, navigability, Indian cities are regarded as some of the worst options for living. One can also add the issue of pollution to this mix and understand the enormity of the crisis. In this context it needs to be understood that the Indian cities were never planned in such a way so as to accommodate a deluge of cars as is the situation now. The apathy of present day urban planners has only made the situation worse.

In the paper we have implemented an idea to spot free spaces available in parking lot. This is done using Image Processing through Matlab.

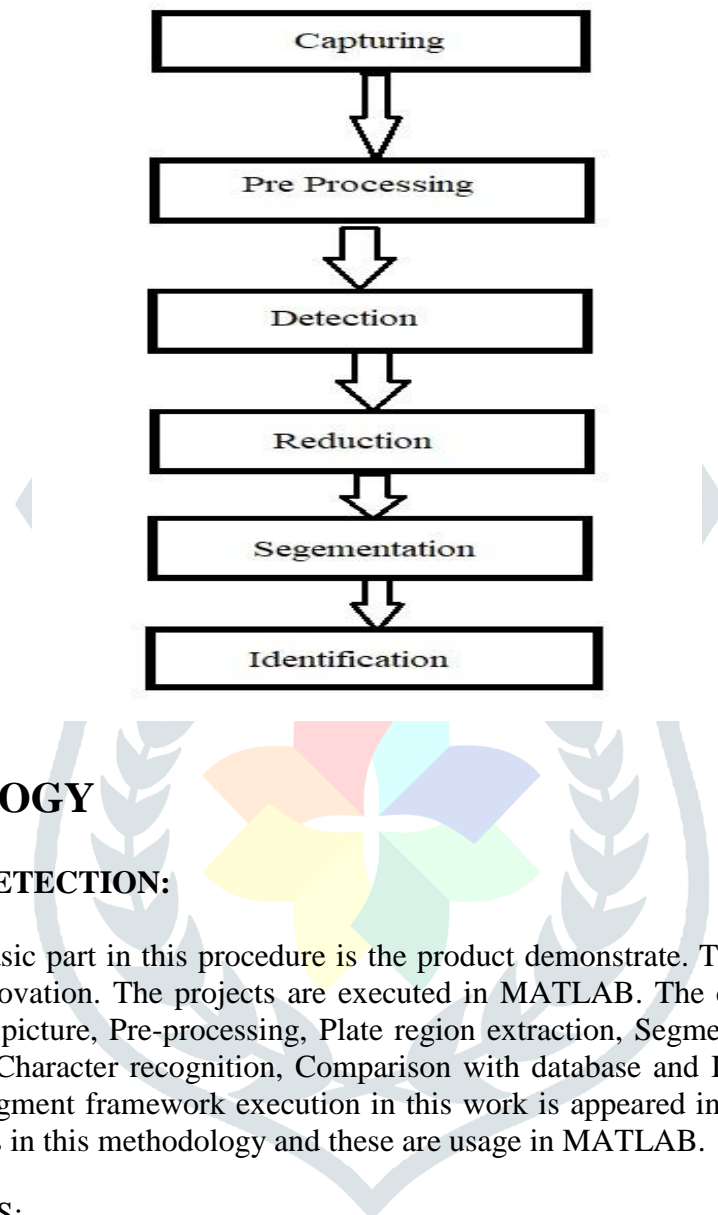
II. THEORY

Image processing is a method to perform some operations on an image, so as to get an improved image or to extract some useful data from it. It is a type of signal processing in which input is an image and output may be image or qualities/features related with that image. These days, image processing is among quickly growing technologies. It forms center research area within design and software disciplines as well.

Image processing basically incorporates the following three stages:

- Importing the image by means of image acquisition tools;
- Analysing and controlling the image;
- Output in which result can be adjusted image or report that is based on image examination.

There are two sorts of methods used for image processing namely, analogue and digital image processing. Analogue image processing can be used for the printed copies like printouts and photos. Image experts use various basics of understandings while using these visual strategies. Digital image processing techniques help in controlling the digital images by utilising computers. The three general stages that wide range of data have to experience while using digital technique are pre-processing, enhancement, and display, information extraction.



III. METHODOLOGY

I. LICENCE PLATE DETECTION:

The first and the most basic part in this procedure is the product demonstrate. The product display utilizes the picture preparing innovation. The projects are executed in MATLAB. The calculation is isolated into following parts: Capture picture, Pre-processing, Plate region extraction, Segmentation of character in the separated number plate, Character recognition, Comparison with database and Indicate result. The stream outline of tag acknowledgment framework execution in this work is appeared in the accompanying figure. There are different strides in this methodology and these are usage in MATLAB.

WORK FLOW PROCESS:

Capture of Image: The initial step is to capture the image. The image is captured by electronic device such as Digital Camera or Webcam. The image caught is saved in JPEG format. Afterwards it is changed to gray scale image in MATLAB.

Pre-processing: The subsequent step in the wake of capturing the image is the pre-processing of the image. At the point when the image is caught there are lot of disturbances and noises present in the image for which the image can't be utilised properly. So in this step the noises from the image are required to be cleared to get an exact output.

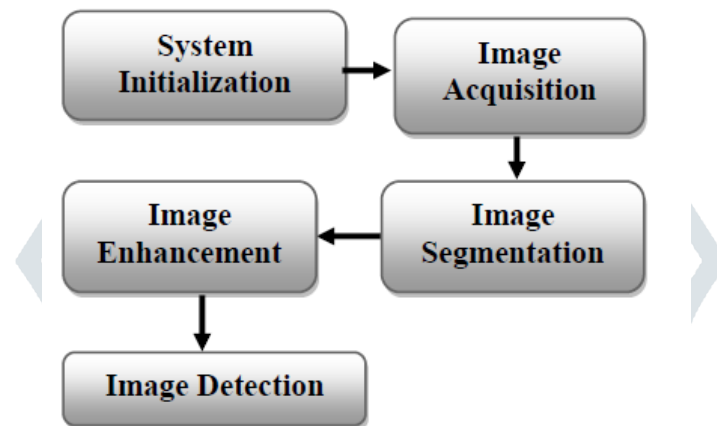
a. Grey Processing: This stage includes the transformation of image to Grey levels. Colour images are transformed into Grey image. As indicated by the R, G, B value in the image, it figures the value of grey value, and gets the grey image at the same time.

b. Median Filtering: Media filtering is the step to expel the noises from the image. Grey level cannot expel the noises. So to eradicate noises from an image, media filtering is used.

Plate region extraction: The most important stage is the extraction of number plate from disintegrated image altogether. The extraction should be possible by utilising image segmentation method. There are several image segmentation methods accessible in various literatures. In majority of the techniques, image binarization is used.

Character segmentation: In this step get the output of extracted number plate utilising labelling parts, and after that differentiate each character and split each and every single character in the number plate image by utilising split and furthermore determine the length of the number plate, at that point discover the connection and database if both the value is same means it will create the value 0-9 and A - Z, and lastly convert the value to string and shows it in edit box, and furthermore stores the character in some text file in this code.

II. FREE SPACE DETECTION:



The free spaces in the parking lot is detected utilising OCR (Optical Character Recognition) technique. OCR is the acknowledgement of printed or created content characters by a PC. This includes recognition of the content character-by-character, investigation of the examined in picture, and after that interpretation of the character picture into character codes, for example, ASCII, usually utilized in data handling. Processing of OCR involves filtering the picture or the bitmap is broken down into light and dull regions so as to recognize each alphabetic letter or numeric digit. At the point when a character is remembered, it is changed over into an ASCII code.

OCR is being utilized by libraries to digitize and protect their property. OCR is additionally used to process checks and charge card slips and sort the mail. Billions of magazines and letters are arranged each day by OCR machines, significantly accelerating mail conveyance.

OCR involves three techniques:

1. Pre Processing
2. Character Recognition
3. Post Processing

1. Pre Processing :

In the event that the image was not adjusted appropriately when examined, it should be tilted a couple of degrees clockwise or counter clockwise so as to make lines of content splendidly level or vertical.

- Smoothing the edges by removing positive and negative spots.
- Binarizing the image i.e., converting the image from RGB to Grayscale and finally to Black & white.
- Builds up benchmark for word and character shapes, isolates words if it is required.
- Standardise aspect ratio and scale.

2. Character Recognition:

Matrix matching includes contrasting an image to a stored glyph on a pixel-by-pixel premise; it is also known as "pattern matching", "pattern recognition", or "image correlation". Feature extraction breaks down glyphs into "features" like lines, closed circles, line course, and line crossing points. The extraction features decreases the dimensionality of the portrayal and makes the recognition procedure computationally productive. These features are contrasted with a dynamic vector-like portrayal of a character, which may diminish to at least one glyph models.

3. Post Processing:

OCR accuracy can be expanded if the result is obliged by a dictionary – a rundown of words that are permitted to happen in a document. This may be, for instance, every one of the words in the English language, or a progressively specialized vocabulary for a particular field. This system can be risky if the record contains words not in the dictionary, as formal people, places or things. The output might be a plain content stream or document of characters, however increasingly refined OCR system can safeguard the first design of the page and produce, for instance, an explained PDF that incorporates both the first image of the page and an accessible textual portrayal. Information of the sentence structure of the language being filtered can likewise help decide whether a word is probably going to be an action word or a thing, for instance, permitting more prominent precision.



In this paper, we have made an assumption here that the car parking is numbered. Earlier, free spaces were detected with the help of sensors which detected the entry and leaving of a car. But we, with the asserted assumption will be using OCR technique to determine the free spaces. The OCR technique helps us in determining the car parking numbers. If the OCR detects a number then the slot is occupied by a car. If the OCR fails to detect any character then the slot is not occupied by any car, that is, it's a free space. With this new concept, parking spaces in a big car parking area can be detected easily and their numbers can also be sent to the system quickly. This makes the process faster and easier.

IV. CONCLUSION

In this paper, the aim was to detect the license plate of a car and also the free space available in a parking lot. With the help of OCR technique, the license plate and the free space were recognised. We have also assumed a new method to determine the free space in a parking lot using OCR technique. The implementation was experimented on various license plates and got the expected outcomes mostly. The whole arrangement was implemented in Matlab and the free spaces were seemed to be detected easily using the OCR technique. The result of our proposed model has proven that the free spaces can be detected easily and quickly using our method. Anyways more experimentation can be done on the proposed model to make it much better and reliable.

IV. OUTPUT

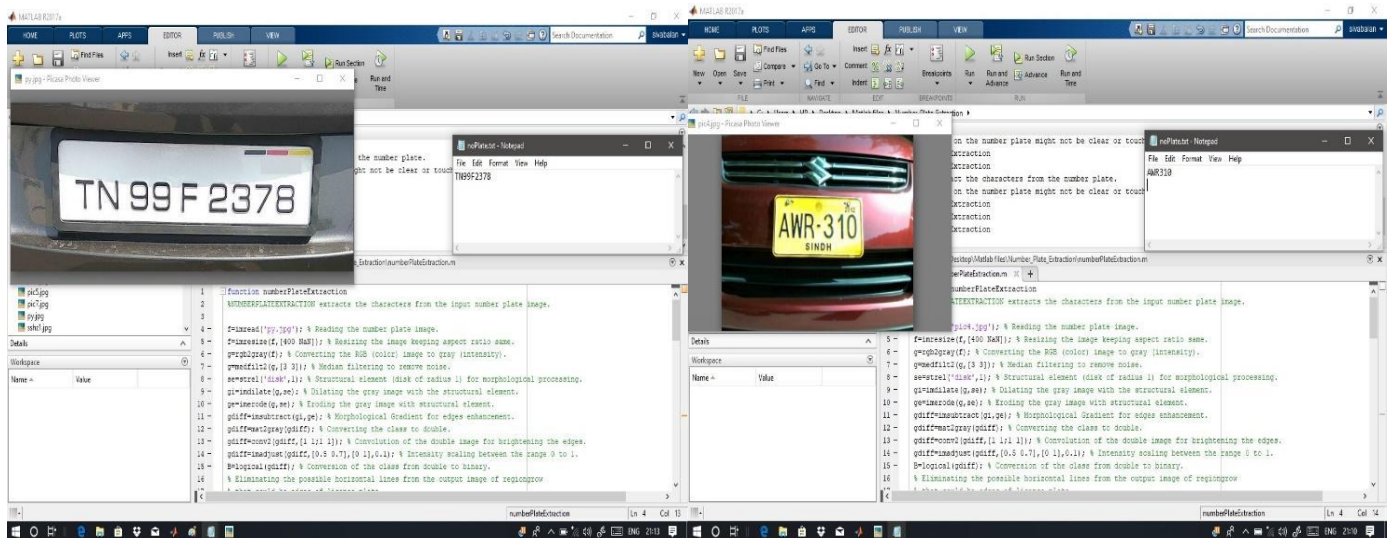


FIG 3.1

FIG 3.2

The figures 3.1 and 3.2 represents the matlab output of the license plate detection. The figure 3.1 represents the yellow license board detection and figure 3.2 represents the white license board detection. The output is printed in a notepad which is shown in the figure

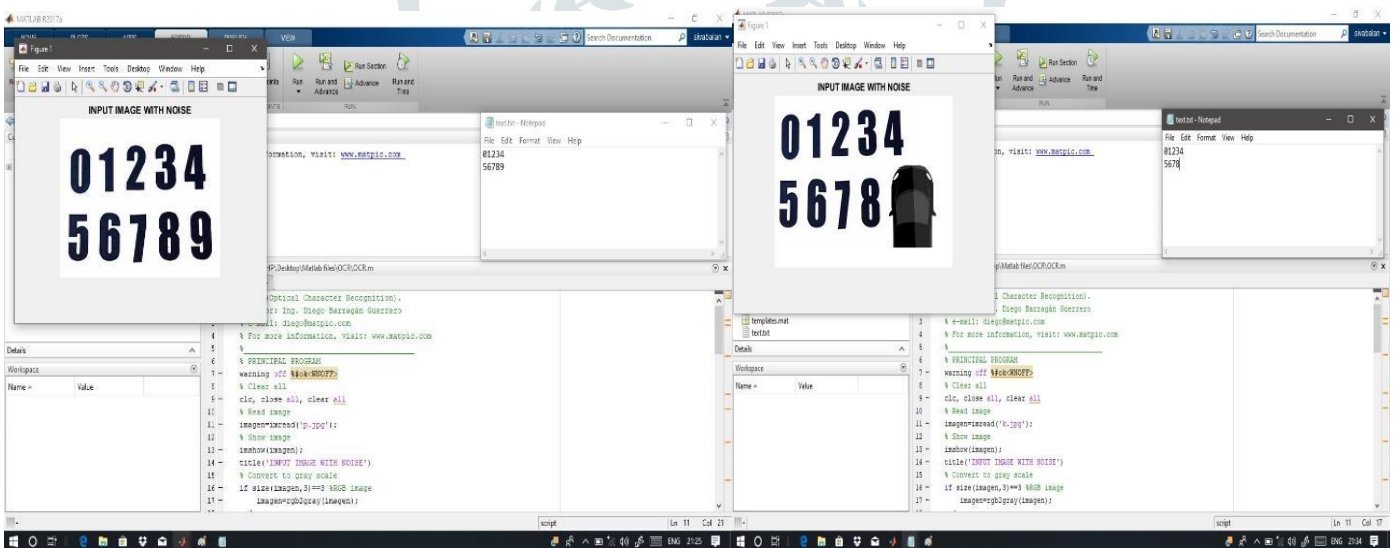


FIG 3.3

FIG 3.4

The figures 3.3 and 3.4 represents the OCR matlab output. The figure 3.3 represents the output of free parking space and the figure 3.4 represents the output of occupied parking space. The output is printed in a notepad which is shown in the figure.

V. CONCLUSION

In this paper, the aim was to detect the license plate of a car and also the free space available in a parking lot. With the help of OCR technique, the license plate and the free space were recognized. We have also assumed a new method to determine the free space in a parking lot using OCR technique. The implementation was experimented on various license plates and got the expected outcomes mostly. The whole arrangement was implemented in Matlab and the free spaces were seemed to be detected easily using the OCR technique. The result of our proposed model has proven that the free spaces can be detected easily and quickly using our method. Anyways more experimentation can be done on the proposed model to make it much better and reliable.

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