License Plate Detection System for Parking in Malls

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ABSTRACT: This paper proposes a method to detect and identify the vehicle number plate that will help in the linking it with owner's bank account or a pre paid account for automatic deduction of the parking fee. This system is an application of Optical character recognition technology in which image is pre processed to localize only the number plate region and an algorithm is applied to extract the characters.
After recognition of the license number, it is linked to the vehicle owner's account to deduct the parking fee.

KEYWORDS: Optical character recognition, Automatic number plate recognition, IR sensor, Arduino board.

I. INTRODUCTION

License plate recognition is an application of optical character recognition (OCR).
This technology enables direct reading of alphanumeric characters from the digital images of the plate captured by an on-site camera. Automatic reading of the registration number means transforming the pixels of the digital image into the ASCII values and representing them in text format. This system proposes to automate the parking fee deduction.
An effort to automate number plate detection system investigates an input image to identify some local patches containing license plate. The number plate region can be present anywhere in the image captured, so scanning the image pixel by pixel is a tedious and time consuming affair. License plate location algorithm consist of steps like as Edge Detection, Morphological operation like dilation and erosion, Smoothing, segmentation of characters and recognition of plate characters.
Pattern recognition, artificial intelligence and computer vision employ OCR technology.
There are two major types of OCR algorithms, which are as follows:-
1. Matrix matching: This involves comparing an image to a template image on a pixel by pixel basis; it is also known as "pattern matching", or "image correlation". This technique is suitable on typewritten and predefined set of fonts of alphanumeric characters
2. Feature extraction: This decomposes the extracted glyphs into "features" like lines, closed loops, line direction, and line intersections. These are compared with an abstract vector-like representation of a character.

II. RELATED WORK

In [7], the authors have stated that input image for pre-processing is a gray scale image, pre-processing has to be performed taking into account the background illumination. Removing background noise before processing is necessary to reduce processing time. Authors of [3] have performed binarization of the captured image using both Otsu's algorithm and Niblack's algorithm and concluded that Niblack's algorithm is more robust in thresholding but Otsu's algorithm is less time consuming.
For character segmentation algorithms such as blob colouring in [3], peak to valley method in [4] and image scissoring algorithm are suggested in [7]. Bounding box method [2] is used after the processing on image to obtain segmented characters. Number plate recognition is now used to compare the each individual character against the complete alphanumeric database using template matching [2].

The matching process moves the template image to all possible positions in a larger source image and computes a numerical index that indicates how well the template matches the image in that position. Based on maximum correlation the character is recognized.

III. PROPOSED ALGORITHM

Methodology:

- IR sensor will detect the presence of the car
- A signal from IR sensor will be sent to the Arduino board which in turn will be input to the MATLAB program.
- Then the program will capture an image from the video feed after a few seconds
- Image will be digitally processed and a text format of registration number will be obtained
- Parking fee will then be deducted after authorization.

IV. PSEUDO CODE

Step 1: Capture the image
Step 2: Convert into gray scale
Step 3: Convert into binary image
Step 4: Apply morphological processing
Step 5: Detect the character
Step 6: Compare with the database of predefined fonts
Step 7: If whole number plate is detected
        Obtain plate number
    Else
        Go to Step 5
Step 8: Deduct the fee.

V. RESULTS

Fig.1. Hardware set up

As shown in the image above the camera is commanded by the MATLAB program to capture image 10s after the detection of obstacle by the IR sensor. This time is given so that user can adjust the position of number plate for better visibility. Then the image undergoes processing as shown in the images below.

Fig.2. Gray scale image

The RGB image captured by the web camera is converted into gray scale image using a MATLAB function. This is done because the processing is to be done on the characters where the colours hold no significance.

Fig.3. Binary image

The gray scale image is again converted into a binary image. This means the image now has only two intensity values namely black and white.

Fig.4. Smoothening of edges

Smoothening of edges of the image is a morphological process in order to smooth out or smudge the unnecessarily sharp edges.

Fig.5. Segmentation of the image

Bounding box method of segmentation is applied on the image to separate the characters on the basis of their width.
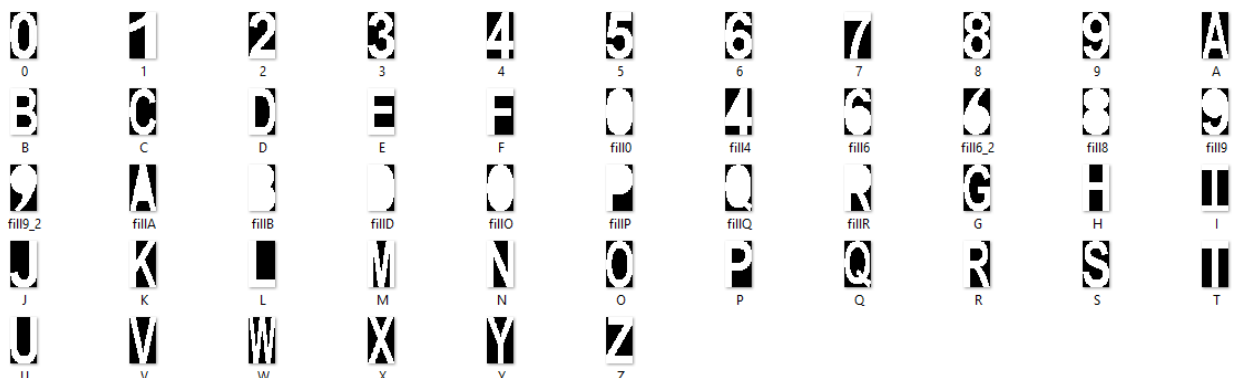
Fig.6. Stored Database

The above image shows the character set stored in image format. The segmented parts will be compared on a pixel by pixel basis with each of these characters.
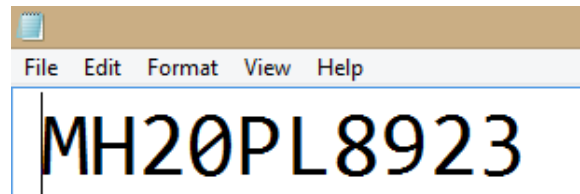
Fig.7. Text Output

The character with which the segmented part has the highest correlation is presented in text format to the user. This operation is performed on every part and the whole licence number is presented as a string.

Fig.8. Fee deduction statement

Presence of this license number in the database is verified and a fixed amount of parking fee is deducted.

VI. CONCLUSION AND FUTURE SCOPE

License plate detection for parking in malls is a proposal system aimed at automating the current parking fee collection system that is mostly done manually. The other advantage of this project is that, it is cost efficient and secured system as it authorizes every number plate. This system has further scope for improvement in processing time and recognition of number plates printed in different fonts and also scripts as is prevalent in India.

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BIOGRAPHY

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