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Automatic Car Number Plate Detection System Using OpenCv

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Abstract: Automatic Number Plate Recognition (ANPR) is an issue that has received a lot of attention and has a lot of successful solutions. Due to the differences in number plate features around the world, these solutions are typically tailored for a specific environment. These attributes are employed in number plate recognition algorithms; thus, a universal solution would be difficult to achieve because the image analysis techniques used to develop these algorithms cannot guarantee 100% accuracy. This research focuses on a proposed method that is optimal for all types of car number plates. The program, which is implemented in Python and uses the OpenCV library, locates the plate by combining edge detection and Feature Detection approaches with mathematical morphology. EasyOCR python package was used to identify the characters on the license plate that were detected.
Keywords: Automatic Number Plate Recognition (ANPR), Edge detection, Open CV, Easy OCR.

I. INTRODUCTION

In an effort to improve the safety, security, and mobility on our roads, Intelligent Transportation Systems (ITSs) have become mainstream. One of the technologies used in ITSs is Automatic Number Plate Recognition (ANPR), which captures and extracts vehicle registration from number plates using image processing techniques.

The ANPR process typically involves three stages:

—plate detection

—plate segmentation

—character recognition

The plate detection stage is the most crucial, as a failure here results in the algorithm's ultimate failure. This stage is mostly determined by the number plate's characteristics. Shape, colour, height, and width, as well as symmetry and spatial frequency, are among these characteristics. The algorithm's ability to recognise the plate is also influenced by the conditions in which the image was captured (lighting, visibility, image skew, and camera quality), as well as the image's type. Most ANPR algorithms have a pre-processing stage that includes gray scaling, thresholding, and noise removal techniques to prepare the image. Simple averaging of RGB values in a color pixel is the most frequent way of gray scaling. Most published ANPR systems rely on proprietary software such as MATLAB. In most cases, these tools are out of reach for developing countries.

II. LITERATURE REVIEW

1) The paper presents an adaptive threshold for highlighting characters and suppressing background. To eliminate .

2) The research is based on the use of the feed forward back propagation method used to classify the characters. In this the Artificial Neural Network is trained using the algorithm known as Back propagation algorithm. There are various steps in preprocessing which are Size normalization, Binarization and Edge detection. Both horizontal as well as vertical histogram and connected component analysis together handle character segmentation problems.

3) This paper includes another method which includes Character regions that are selected by Binarization and connected component analysis. Also it includes a method known as blob analysis method which removes unnecessary blobs, combines fragmented blobs and also split clumped blobs. This project achieved 97.2% accuracy in character segmentation and the recognition accuracy was 90.9%.

4) The paper presents an approach which is based on efficient morphological operations and the Sobel Edge Detection method. This approach is simplified using the bounding box method. Later approach matching segmentation template is used to recognize numbers and characters. The project was implemented using MATLAB.

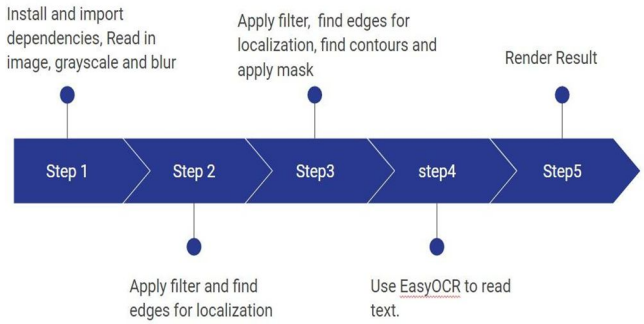
5) Project explained an overview of the connected component analysis and different processes such as aspect ratio and pixel count analysis were discussed.

6) In this paper the author studied and compared the four components which are cascade classifiers using statistical features, Hough Transform and Contour algorithm, mean shift approach and morphological operations. Later their results were shown. Handwritten text segmentation

7) The work in this paper has been done using the Morphological Watershed Algorithm. Activities such as noise removal, slant correction, binarization and normalization are done in the preprocessing stage itself. Later extraction of segmented images was done by reversible integer to integer wavelet transform. Finally classification was done by a neural classifier.

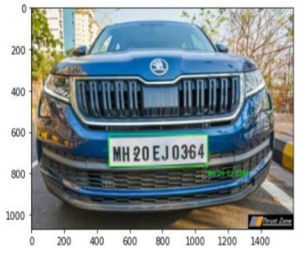
III. METHODOLOGY

The methodology of this project can be briefly and very roughly divided into three crude forms which are : 1. to import the image and localize the license place in it, 2. Extract the text, numbers and other characters from the license plate, 3. At last we have to apply Optical character recognition(OCR) so as to recognise the characters and finally render the result and image in an understandable format. To discuss the steps and methodologies included in the project, We can say that our project has 7 basic steps. the first one is pretty simple but necessary, which is importing and installing the dependencies. We will be using dependencies like EasyOCR, matplotlib, Numpy, etc. Secondly, we will be reading the image in our program using opencv and grayscale it. Moving ahead, in the third step, we will be applying and finding edges for the localization of the license plate on the car. Ahead to the 4th step, we will contour our edged image by applying a mask. Here, we will get the location of the license plate in the form of an array of coordinates. We will then mask or snip away the rest of the image and only let our license plate be there in the picture. moving to 5th step, here we use EasyOCR to read our license number in the form of text. At this step, we get the location array of coordinates, the license no. in text format and also the accuracy of how accurately the program has managed to convert the image characters into text. ahead to the final step, we finally visualize and render our result to get an image with license no. in text forged underneath the license plate of the image.




```
In [36]: text = result[0][-2]
         font = cv2.FONT_HERSHEY_SIMPLEX
         res = cv2.putText(img, text=text, org=(approx[0][0][0], approx[1][0][1]+60), fontFace=font, fontScale=1, color=(0,255,0), thickne
         res = cv2.rectangle(img, tuple(approx[0][0]), tuple(approx[2][0]), (0,255,0),3)
         plt.imshow(cv2.cvtColor(res, cv2.COLOR_BGR2RGB))

Out[36]: <matplotlib.image.AxesImage at 0x1f292f6ebe0>
```



IV. RESULTS AND DISCUSSIONS

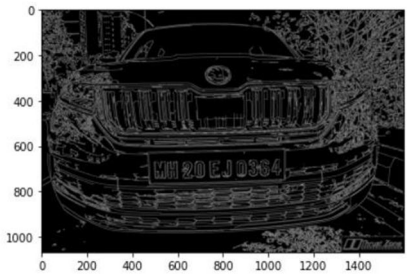
1) At the end of the project we will be able to read the license number automatically generated in text format by the program.

2) We will also be able to receive the accuracy of the generated text.

3) We will also get a rendered picture in which the license number will be printed in text format on the picture itself for better visualization.


```
In [38]: bfilter = cv2.bilateralFilter(gray, 11, 17, 17)
         edged = cv2.Canny(bfilter, 30, 200)
         plt.imshow(cv2.cvtColor(edged, cv2.COLOR_BGR2RGB))

Out[38]: <matplotlib.image.AxesImage at 0x1f20bea2d60>
```



V. FUTURE SCOPE

1) The ability to detect and display text from images and videos will surely come in real handy in our daily lives and of course in future we can only expect to see an increment in the use of this technology.

2) ANPR system makes it very easy for Traffic Law Authorities to get the details about those vehicles who have breached traffic protocols and act accordingly

3) In the near future we are planning to implement this system by using Raspberry Pi and Camera module to get real time data so that we can detect number plates on the go.

4) Apart from detecting number plates and security related applications of this project, we can also modify this application to detect different languages and add a translator to it so that it becomes convenient for people traveling abroad in different countries.

VI. CONCLUSION

At the end of the project we will be able to read the license number automatically generated in text format by the program.We will also be able to receive the accuracy of the the generated text.We will also get a rendered picture in which the license number will be printed in text format on the picture itself for better visualization.

VII. ACKNOWLEDGMENT

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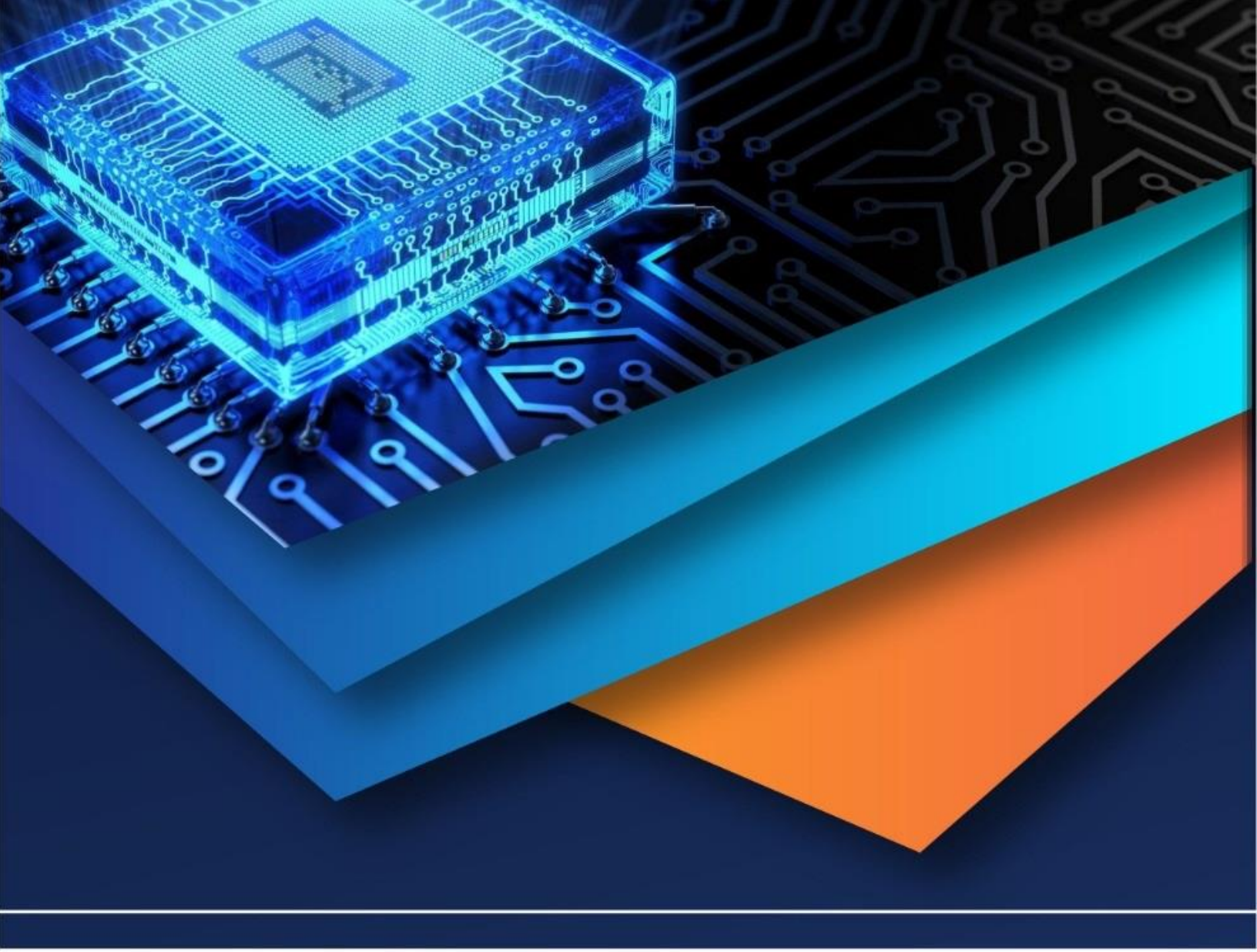

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