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AUTOMATIC NUMBER PLATE RECOGNITION SYSTEM

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ABSTRACT

In our daily life we are seeing the rapid increase of the population and so was the traffic also. Which is making the bigger problem day by day to monitor the vehicles which are going by and maintaining the data base is even more complicated issue now a days which requires large amount of the man power and also wastage of the human resources. We can see it is very complicated to find the human resources now a days. To reduce the problem we are going to develop the algorithm so that we can easily detect the number plate and we can reduce the task. We can implement this kind of system in the main roads to monitor the vehicle and detect any unauthorized vehicles which are going around which helps in the improvement of the security. By changing the day light the image color also changes. Since we are considering the gray color image the morning captured image and the night captured image and not much different. One of the major problem is that the font of the image. When the font is in the different design it becomes the complicated to recognize and analyses the number of the vehicle. Since we are having the rule that all the number plates must contains the official font and size which would be more help full for to recognize the number of the vehicle. We capturing the live image from the webcam and eliminates the error range. Some other small problems like the number plate is hanging in the cross format instead of the straight line. Those problem are very complicated to handle and they are also very rare we are currently focusing on the major problems. With the help of our project we can reduce the man power which is require to maintain the data based and it is even possible to implement in the desert areas which are distant to the residents and on the main roads.

Key Terms: Number Plate Extraction, Median Filter, Edge Detection, Number Extraction And Number Comparison.

I. INTRODUCTION

In our project we considering the gray color image instead of the RGB color image which because the are some different color number plates like the yellow, white and some are in the grey color. To avoid such confusion in the color plates we are considering the grey color images which reduces the back ground color of the number plate. After converting to the gray color we resizing the image to made easy the calculation and reduce the error read while analyzing the image. For clear understanding we are going to take a look at the images with the different colors.

(a) Number plate image with the back ground yellow

(b) Number plate with white color back ground

(c) Grey color image of the image (a)

(d) Grey color image of image (b)

We can clearly see the difference between the color image and grey color image. Even though the back ground of image (a) is yellow and the other one in white we can see the resultant grey color image is almost close.The image applied through the median filter to remove the unnecessary noise. The median filter is used to reduce the noise in the image and it is only applicable for only few types of images like salt and pepper noise. Resultant picture is obtained with all the pixels are modified to the average of the all surrounding eight pixels.

(a) Considered input image

(b) Applied median filter for 3*3

(c) Applied median filter for 30*30

Edge detection is applied on the images to recognize the edges in the images. When the image is applied through the image expansion and image compression we get two resultant images. When the images are processed the subtraction of both the images resulted in such a way that only the edge is only remained in the image. The resultant image is in the grey format which must be converted to the binary format. To increase the brightness of the edges we are going to apply the convolution of the image.

Compressing an image is as fallows, for the corresponding elements of A(x,y) by B(x,y) is as fallows

$$(A \ominus B)(x,y) = min\{A(x + x^1, y + y^1) - B(x^1, y^1) | (x^1, y^1) \in D_B\}$$

Expanding an image includes following algorithms. Let consider dilation A by B denoted $A \oplus B$ is defined as set operation: $A \oplus B = \{z | (B)_z \cap A \neq \emptyset\}$

We can see the images different types of objects, to detect all the objects in the image we are Appling edge detection technique which provides us image containing only edges. We are Appling image compression and image expansions techniques. We are acquiring two different images and those images are subtracted which gives the edges of the image. We see the sample images and resultant images.

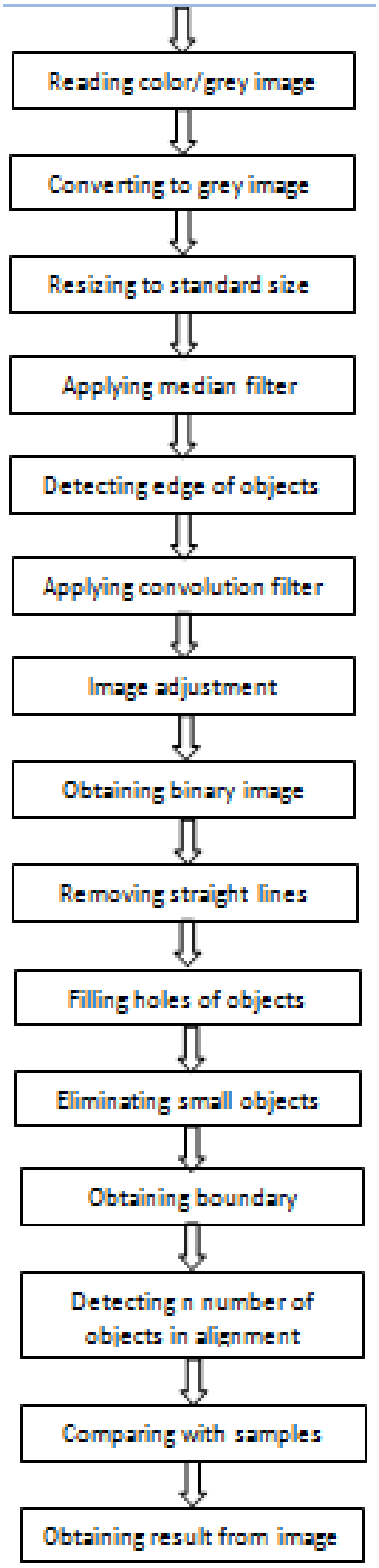
(a) Expande d image (b) Compressed image (c) Resultant image

The resultant image is converted to class double since it is complicated to process if the image is in the character format. Two dimensional convolution is applied to the image to soften the edges of the images. Let a and b be the functions of 2 different discrete values of n_1 and n_2 which gives the resultant convolution of 2 dimensional convolution is a and b.

$$c(n_1, n_2) = \sum_{k_1=-\infty}^{\infty} \sum_{k_2=-\infty}^{\infty} a(k_1, k_2) b(n_1 - k_1, n_2 - k_2)$$

Scaling is applied to the image to eliminate unnecessary noise in the image. After eliminating the noise pixels or the pixels surrounding at the boundaries are altered. The resultant image acquired after the adjusting the boundaries is converted to the binary image. The resultant images are shown below.

II. BLOCK DIAGRAM



If we apply median filter more than the 3*3 matrix the originality in the resultant image will be lost. We can see of the picture when it is applied for the matrix 3*3 and also the matrix 30*30.

(a) Convolution image (b) Adjusted image (c) Logical or binary image

The resultant image goes through series of development to eliminate the unnecessary objects in the image. The resultant logical image goes through edge expansion and subtraction to remove the unnecessary straight lines in the image. Then the image is processed to fill the spots in the image or center of the recognized objects, removing the unnecessary objects by filling the black color, the small objects are covered with the black pixels to remove the objects. Then the final image is resulted with the large size of objects, which includes the numbers, alphabets, and other unnecessary writings in the image. Since are only needing the number of the plate, we are calculating all the objects in the image and they are analyzed if objects are in the same alignment or the alignment is changed. In the short note we already know how many numbers supposed to on the number plate since count of the number does not change we are looking if any total number are in the same alignment. If the alignment is same we finally find out the numbers in the image. Let us see the example images we considered and processed for better understanding process.

(a) Removing straight lines (b) filling the holes in image (c) Removing small objects

We can see in the final image almost all noise objects are removed and we can see almost clear image. The only remaining objects are some side lines, numbers, signature and some bolt marks. One of the easy way to short list or find the registered number plate is by measuring the alignment of the objects. If we consider the alignment we can clearly see two bolt marks are of same alignment, two side lines are in same alignment, registered number plate is in one alignment and the reaming one is name of owner. By counting the objects in each alignment there are

- Bolt marks - 2
- Side lines - 2
- Registered number - 6
- Name - 5

One thing we have to observe in the above image is that we already know the total no numbers in number plate which are number 6. If we check for the six objects in same alignment then we can easily calculate the number and eliminate the other unnecessary things in the image. To analyze image we are obtaining the total objects in the image which are as follows.

Total no finely detected objects and their dimensions

X-axis	005	010	035	069	102	169	184	217	236	248	272	293	308	364	415	432	444	482	521
Y-axis	139	091	132	075	136	137	266	269	267	187	270	135	268	140	076	143	388	079	090
Length	001	034	057	030	055	061	025	008	026	024	026	057	026	057	029	056	087	035	001
Height	160	222	111	030	109	025	032	030	033	011	033	113	033	109	032	106	009	243	143

Above shown table consists X-axis boundaries, Y-axis boundaries, Length of object, Height of objects. In the image we can clearly the 19 objects which are finally available. Out of these the only required objects are six objects which are aligned in one alignment which menace Y co-ordinates of the all six objects are equal almost same and Height is also similar for all six objects. The X-axis and length may vary with the position of the object and size of the letter with respectively. By applying the histogram technique we can easily point out same alignment components and the remaining components. The same alignment components are listed below with the corresponding values.

The boundaries of the all six objects are as follows with respective of the letter/number

Letter/number	A	K	H	3	4	3
X-axis	035.5000	102.5000	169.5000	293.5000	364.5000	432.5000
Y-axis	132.5000	136.5000	137.5000	135.5000	140.5000	143.5000
Length	057.0000	055.0000	061.0000	057.0000	057.0000	388.0000
Height	111.0000	109.0000	025.0000	113.0000	109.0000	079.0000

The resultant images which are extracted from the final images are shown below

(a) Letter 1 (b) Letter 2 (c) Letter 3 (d) Letter 4 (e) Letter 5 (f) Letter 6

Since we successfully extracted the numbers from the image the only remaining task is to find out what number is it. For that purpose are having some reference. We have the images which are already stored in data base with sample of images. Once the results are obtained we are calculating all the images and which one is matched maximum and the number is analyzed from the image. Let see some sample images which we stored initially.

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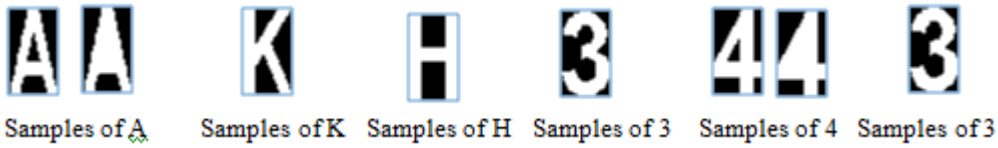

Samples of A Samples of K Samples of H Samples of 3 Samples of 4 Samples of 3

Every sample is resized to fixed size which is 42*24.

The resultant number extracted from registration plate is “AKH343".\

III. CONCLUSION

In our project we read sample vehicle license plate number successfully analyzed the image. As a result we successfully eliminated unnecessary noises and unnecessary text on the license plate are successfully removed and obtained the image boundaries. Those images are successfully compared with the sample images of the all alphabets, numerical numbers etc and obtained results. Those are accurate. We got successfully reading when compared with other previses algorithms. Our algorithm successfully obtain results when digits are constant, the number plate is in straight line manner not in cross line.

3.1 Experimental Results

Here are some practical results of the images which we considered as inputs and their outputs as follows.

Input image one

Output image one

Input image two

Output image two

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