Small Image Recognition From Large Image Using New Thresholding Technique

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Abstract

Image processing is one huge field nowadays. To recognize small part of the image is very important concept of image processing. That recognized part can be used for different security purpose. Another thing is to find one image from large image or from set of image is also very essential in security system. To find the criminal or any rule breaker can be possible using this system. This is only possible with different steps like capture image, convert image in to black and white image, segmentation, matching and identification. Here in second step such as convert colour image into black and white is very important step. If it is proper conversion then and then we can get optimal output. So here in this paper I have used new proposed thresholding technique for better conversion. I have also used correlation co-efficient for matching image. One of the big problems of computer image is image matching or matching of pixel of one image to another image. So here I have used this correlation coefficient method to solve that problem.

Keywords: segmentation, recognition, thresholding.

1. Introduction

There are number of problem in image processing. Image may be captured or scanned image. Pixel is one smallest element of image and every pixel has intensity. This smallest element of image is very important for image matching. Image matching or finding corresponding features in different images of scene is a necessary step in most computer vision.

2. Difficulties with image processing

Image matching is one general step of computer vision system. Other numbers of difficulties are
   2.1. Obstacle detection

   2.2. Camera calibration
   2.3. Motion estimation
   2.4. Object tracking
These all are important to solve at initial level. Some description of that is available here.

2.1. Object detection

It is an important part of image processing. It is a process to detect one part of the image from entire image. It is also include pedestrian detection and face detection [1][2].

2.2. Camera calibration

Camera calibration is very difficult process in image processing. It is used to inspect an image or video and presume what the camera situation was at the time the image was captured. There are number of uses of camera calibration like robotic applications [3][4][5][6]

2.3. Motion estimation

To determine the motion vectors, Motion estimation can be used. This motion vector is one important part of the image that can be used to describe the transformation from one 2D image to another. This motion vectors may be for whole image or some small part of image like random shapes patches, rectangular blocks etc. There are number of models like translational model that can approximate the motion of a real video camera, such as rotation and translation in all three dimensions and zoom [7].

2.4 Object tracking

Video tracking is the process of tracking object or more then one objects over time using a camera. It is very time consuming process. There are number of applications like surveillance system, video

compression, traffic control, security system, medical imaging [10] and human-computer interaction.

3. Proposed algorithm for image recognition from whole image

In proposed thresholding algorithm there are number of steps to recognize image from large image. This image can be identified based on the data base image. There are number of steps as shown in below figure. 3.1
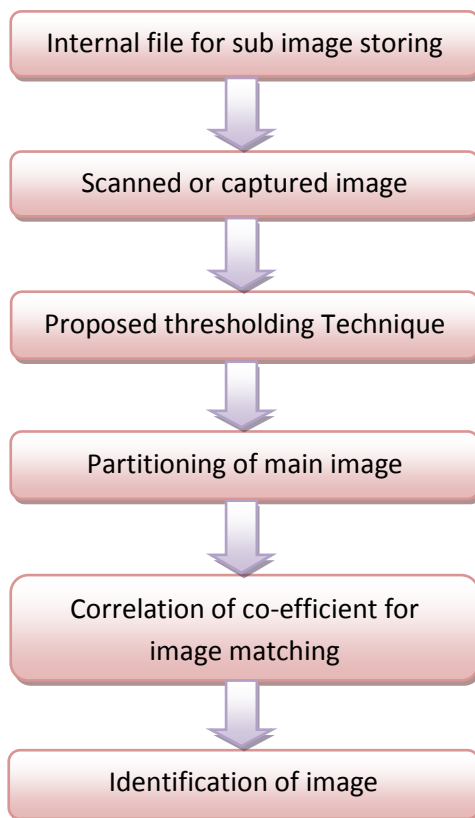

Fig.3.1 Steps of proposed thresholding algorithm

3.1 Internal file for sub image storing

In matlab we can create file with different command. This file can be used to store image in binary form. In binary only two alternatives are there that is 0 (zero) and 1 (one). We can consider this 0 and 1 as pixel value. In black and white image 0 represents black colour and 1 represents white colour. This value can be used to match pixel of one black and white image to other black and white image. This file can be used as database which has information of different images. So at the initial level we have to store different images in matlab file, then after this can be used for different purpose at letter stage.

3.2 Scanned or capture image

The image can be of scanned image or captured image. This image is large image and can be used as input image. Here the quality of image is more important. The good quality image can give optimal result. The noisy and blurred image cannot match with the image which has been stored in file or database.

3.3 Proposed thresholding technique

As we have discussed that number of images are stored in database or file in matlab. To compare each and every pixel of input image and stored image is very difficult task. If our image is color image then fist step is to convert color image into black and white image because we have store number of images in database in binary form. It is very difficult and challenging task to convert color image into black and white image. There are number of techniques are proposed to solve this technique. In matlab im2bw function is used to convert image in to black and white. But this function has two arguments, first is image object and second is level. To find the proper value of level is quite difficult task because every pixel in image has different value. If this level value is proper then and then proper conversion is possible. To find the accurate value of "level" different methods are used. One technique used with matlab command is graythresh function. This function is used otsu's method. Other number of methods is proposed like thresholding of white, thresholding of Bernsen, thresholding of Niblack and thresholding with sauvola's technique. Here sauvola's thresholding technique is new version of Niblack method. In proposed thresholding technique I have used the concept of this both the methods to find the accurate value of level.

Niblack method:

$$T(i, j) = m(i, j) + k\ \sigma(i\ , j)$$

Sauvola's technique:

$$T(i\ , j) = m(i\ , j) + [1 + k(\sigma(i\ , j)\ /\ R)) - 1\ ]$$

Proposed technique:

In proposed thresholding technique every pixel values have been considered. First three values have been found ie. i, j and k. Using these all the values mean value can be found. Now this mean value is used to find the level value.

3.4 Partitioning of main image

Partitioning is a process of segmentation. Divide whole image into fixed size. This size must be same as the size of stored image. To find the database image from the large image it is essential step to divide whole image in to different parts. This partitioning is also known as segmentation. Next step is to crop image from the large image. Then after the essential step is conversion of cropped image in to binary shown in below fig. 3.4.1, 3.4.2, 3.4.3, 3.4.4.

Fig. 3.4.1 Binary image of character 'D'

Fig. 3.4.2 Binary image of Rectangle shape

Fig. 3.4.3 Binary image of Diamond shape

Fig. 3.4.4 Binary image of any pattern

From above figure we can say that in every black and white image have only two values that are 0 and 1. Here 0 for black and 1 for white. So one is fore ground and second is back ground. These values are used for matching with other image. But before conversion of color image in to black and white image first noise must be removed from image. In above fig. 3.4.1 is single character, in fig. 3.4.2 rectangle shape, in fig. 3.4.3 binary diamond shape and in fig. 3.4.4 is any image of different patterns, means any kind of image can be stored and match with other figure. If figure has more noise, then this value can be changed. So it may return wrong shape or character.

3.5 Correlation of coefficient

In mathematic one equation is there, it is known as Pearson's correlation coefficient. This equation is

returned one value which is used to find the correlation strength. This strength may be weak correlation, moderator correlation, uncorrelated, strong correlation and perfect correlation. Here perfect correlation means both images are identical images.

3.6 Analysis

In matlab file or in database we have stored number of images. To identify this image from large image can be possible using image matching process. To match every pixel of one image with other image is required for matching. This matching rate can be found from the value of Pearson's correlation. Based on this value we can easily find the matching. With the different number of characters and images we can compare above both methods. Comparison and analysis is shown in below fig. 3.6.1
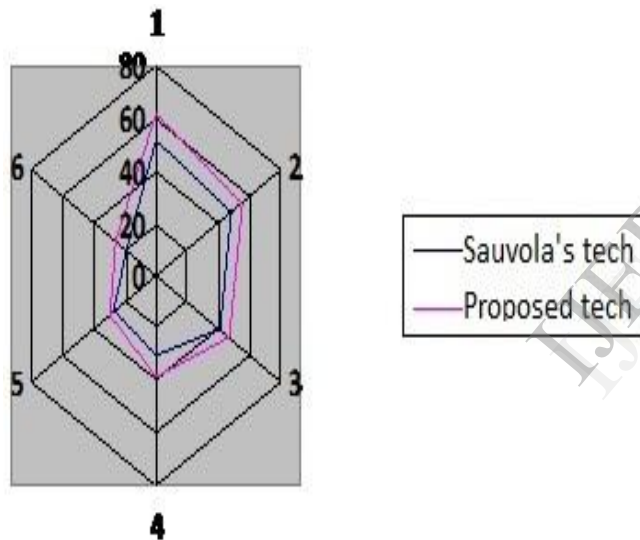

Fig. 3.6.1 Comparison of Sauvola's technique and proposed technique

References

[1] R.Elias H.Hajjdiab and R.Lagani`ere, "Wide baseline obstacle detection and localization," in in Proceedings of the IEEE Seventh International Symposium on Signal Processing and its Applications, Paris-France, July 2003, vol. 1, pp. 21–24.

[2] Z. Zhang, R. Weiss, and A.R. Hanson, "Obstacle detection based on qualitative and quantitative 3d reconstruction," IEEE trans. on Pattern Analysis and Machine Intelligence, vol. 19, no. 1, pp. 15–26, Jan 1997.

[3] B. Triggs, "Autocalibration from planar scenes," in In Proc. European Conference on Computer Vision, 1998, pp. 89–105.

[4] J.F. Vigueras M.O. Berger and G. Simon, "Iterative multi-planar camera calibration: improving stability using model selection," Vision, Video and Graphics, pp. 1–8, 2003.

[5] Z. Zhang, "Flexible camera calibration by viewing a plane from unknown orientations," in In Proc. 7th International Conference on Computer Vision, 1999, vol. 1, pp. 666–673.

[6] C. Matsunaga anf K. Kanatani, "Calibration of a moving camera using a planar pattern: optimal computation, reliability evaluation and stabilization by model selection," Proc. 6th Euro. Conf. Computer Vision, Dublin, Ireland, vol. 2, pp. 595–609, 2000.

[7] P. Fornland, "Direct obstacle detection and motion from spatio-temporal derivatives," in CAIP, Prague,Czech Republic, Sept 1995.

[8] S. Carlsson, "Recognizing walking people," in European conf. on Computer Vision, 2000.

[9] T. Williamson and C. Thorpe, "A specialized multi-baseline stereo technique for obstacle detection," in IEEE conf. on Computer Vision and Pattern Recognition, 1998, pp. 238–244.

[10] P. Beardsley. Matching images of urban scenes. Technical Report TR2003-09, Mitsubishi electric research laboratories, February 2003.

[11] C. M. Christoudias, B. Georgescu, and P. Meer.Synergism in low level vision. In ICPR, pages IV: 150–156, 2002.

[12] O. Chum and J. Matas. Matching with prosac: Progressiv sample consensus. In CVPR, pages I: 220–226, 2005.

[13] G. D. Finlayson, S. D. Hordley, and M. S. Drew. Removing shadows from images. In ECCV, pages 823–836, 2002.