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"New Approach for Automatic Separation of ROI and BG in Crime Scene Images"

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***Abstract*-Crime scene images are very sensitive to do any kind of preprocessing and compression, but the use of images is increasing in exponential manner in crime detection and crime solving, so we require to compress the crime scene images as well. For more compression ratio we can use Region of Interest (ROI) compression. For crime scene images our ROI may be evidences of crime. We might have multiple ROIs in crime scene images. Sometimes it may not possible to select ROI manually; because ROI may be too small and even sometimes we can miss some evidences in manual ROI selection. The solution to this problem is automatic separation of ROI and background (BG). In this paper, I had implemented one algorithm for automatic separation of ROI and BG for crime scene images. I had use color crime scene image for automatic separation of ROI and BG.**

***Keywords*:** ROI, BG.

I. INTRODUCTION

In conventional compression model, an entire image is compressed with single compression ratio, i.e. equal or same level of compression is applied to the useful area as well as to the redundant area of an image. But in crime image compression it is desired to preserve the quality of a particular portion of an image more as compared to the rest of the image. The disadvantage of a conventional compression system is that it will compress the entire image with same compression ratio. Hence we cannot get a good overall compression performance in case of a conventional compression algorithm. And that is where a newer concept of compression, called the Contextual compression arises where the important and unimportant areas of an image are compressed with different compression ratios [2][3].

Now, crime scene images comprise of: Region of Interest (ROI), that used for the diagnosis and unimportant area-Background region, which comprises the less important information and is redundant. The background area in a crime image is quite large and we can compress it with quite a large compression ratio as it contains the redundant information. Again we cannot compress the diagnostically important area (ROI) beyond certain CR, in order to retain quality of the reconstructed image. Hence, the Contextual compression aims at compressing the ROI with the best quality (and least CR) and compressing the background with poor quality (and highest CR) to attain an overall better compression performance.

In crime scene images there are multiple ROIs and some of the ROIs are too small like bullets of gun, so we may miss to select that kind of ROIs in manual selection procedure. I had proposed one solution for this problem which is automatic separation of ROI and BG. By this method we can separate the ROI and BG and then compress them separately.

The other use of this method is that if some evidences are too small and not found by detectives but they are present in an image then if we apply this method to that crime scene image then those evidences can be highlighted.

II. PROBLEMS IN AUTOMATIC SEPARATION OF ROI AND BG

The problems in an automatic separation are that, we have variety of images and every image has different ROI and BG. Even if the ROI is same then also the size and color of the ROI and BG are different.

Other problem is that, we have multiple ROIs in crime scene images and ROI is total subjective matter, means we cannot predefine general ROI for all kinds of images, but when we see the image then only we can differentiate the ROI and BG. There is no any

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general method exist for automatic separation of ROI and BG for all kinds of images.

III. PROPOSED SOLUTION FOR AUTOMATIC SEPARATION OF ROI AND BG

Previously we are using the roipolly() and immultiply() functions for manual selection of ROI in gray scale medical images [2][3]. Here I had use color crime scene images for my experiment. I had deal with this problem by trial and error method.

Because the ROI is totally subjective part, user will decide that which portion of an image is ROI and which portion is BG. Then user will crop small portion of the BG which we will use as a reference. Then we will separate the R, G and B component of that cropped portion and then we will compare that reference R, G and B component with original image`s R, G and B component. By comparison we will separate the ROI and BG of a crime scene image [4].

Following are the steps for proposed algorithm,

Step1) Read the image using imread() function in MATLAB.

Step2) Crop the small portion of BG according to your requirement using imcrop() function in MATLAB..

Step3) Separate the R, G and B component of cropped portion of an image using mask_img() function in MATLAB.

Step4) Find Rmin, Rmax, Gmin, Gmax, Bmin and Bmax values from R, G and B component of cropped portion using max() and min() functions in MATLAB.

Step5) Separate the R, G and B component of an original image mask_img() function in MATLAB.

Step6) Move pixel by pixel in an original image and if the R component of any pixel in an original image falls between Rmin and Rmax then consider that pixel as BG pixel and change intensity value of that pixel to 0.

Step7) Move pixel by pixel in an original image and if the G component of any pixel in an original image falls between Gmin and Gmax then consider that pixel as BG pixel change intensity value of that pixel to 0.

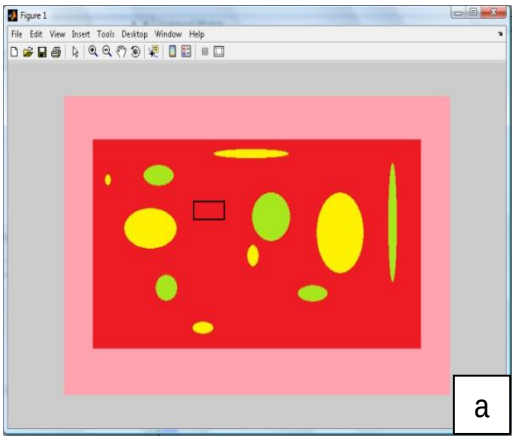
Step8) Move pixel by pixel in an original image and if the B component of any pixel in an original image falls between Bmin and Bmax then consider that pixel as BG pixel change intensity value of that pixel to 0.

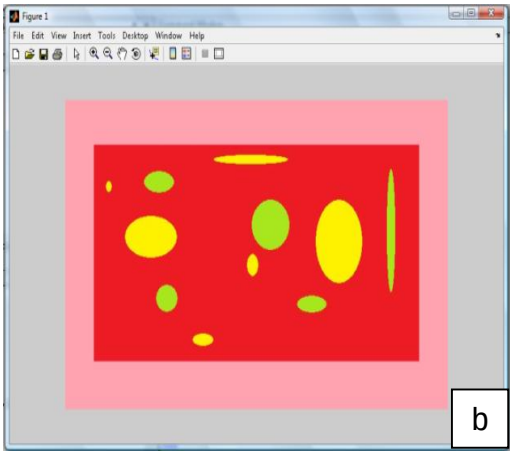
Step9) Combine the R, G and B component of an original image.

Step10) Subtract the output image from original image using imsubtract() function in MATLAB, So that we can get separated ROI and BG.

IV. RESULTS AND DISCUSSION

The results for this algorithm are shown in Fig. 1. This method will work perfect on images which are generated with paint because images generated with paints have constant intensity in every regions of an image.





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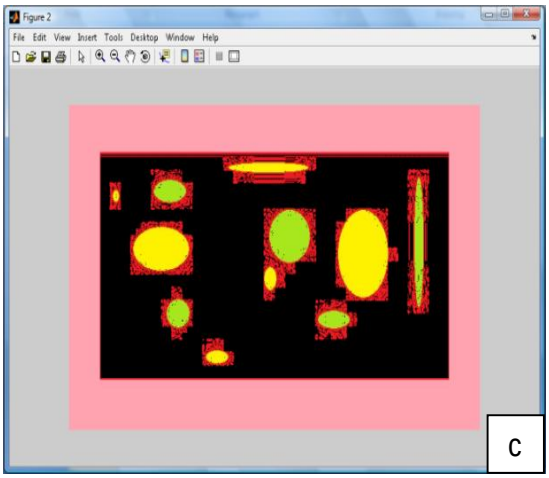
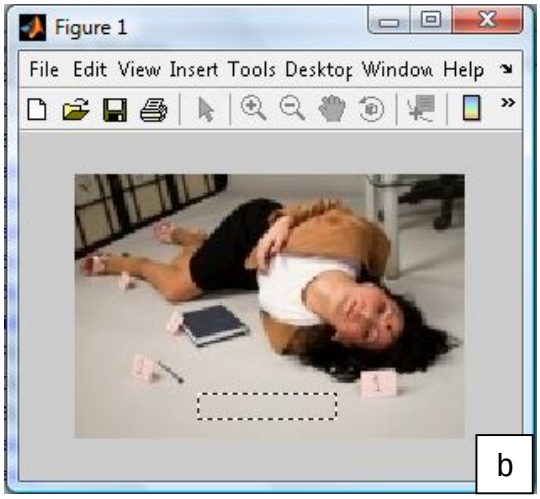


Fig.1 (a) Original image (b) Crop portion of BG (c) Separated ROI

Fig.1(a) represent the original image in which the circles with yellow and green colors are our ROIs and red colored portion of image is BG. Our aim is to separate this two component. In Fig.1(b), we had crop red colored portion of original image which we will use as reference for detection of BG. Fig.1(c) shows the separated ROI portion from the original image.

From Fig.1 we can see that this proposed method work perfect on paint generated sample images. Now, Fig.2 shows the results for real crime scene images. Fig.2(a) represent the original crime image in which the dead body and other evidences are our ROIs and white colored floor area of image is BG. In Fig.2(b) we had crop white colored floor portion of original crime image which we will use as reference for detection of BG. Fig.2(c) shows the separated ROI portion from the original crime image.



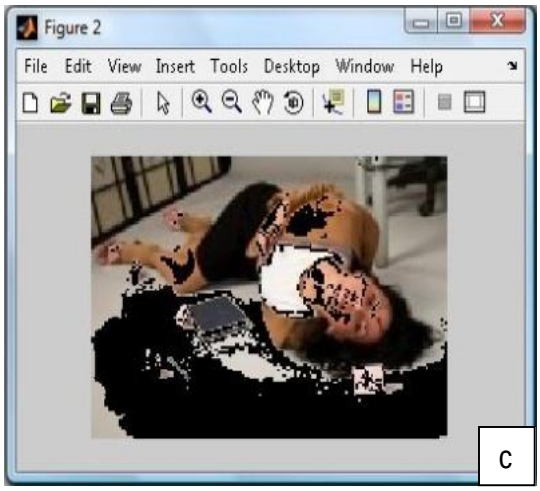


Fig. 2 (a)Original crime scene image (b) Crop portion of BG (c) Separated ROI

We can see from Fig.2 that this method have some problems with real crime images. The problem is that difference in illumination on the floor area. We can see in the image that floors area has single color but then also we are not getting proper results because the illumination on floor are is not constant. That is why this method cannot consider the rest portion of image as BG.

Now, let see what happens exactly in this proposed method. In the first step this method will ask you to crop some portion of BG so that it can take that portion as a reference of BG.

In the next step it will separate the R, G and B components of the original image and cropped portion of original image. Then it will find the Rmin, Rmax, Gmin, Gmax, Bmin and Bmax of the cropped portion and compare it with the original image`s R, G and B

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component. Now if the pixel value of R component of the original image is between Rmax and Rmin then it will consider that pixel in BG. Similarly it will do comparison for G and B component of the original image. But because of illumination problem all the BG pixels value will not fall between Rmax and Rmin similarly for G and B component.

Here the other problem is that our ROI and BG may have some common colour. So, the ROI which having the intensity value same as BG will also consider as a BG.

V. CONCLUSION AND FUTURE WORK

ROI and BG separation is very useful and important in contextual ROI compression techniques. This proposed method will provide automation for separation of ROI and BG, but if the ROI and BG have same color then it will consider the ROI in BG, so this can be improved in future. This method can provide better results for real crime scene images with some pre-processing step in future.

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