

Detect change between two identical coloured image using 8-bit exclusive-OR logical operation

Muna Jaffer AL-Shamdeen

Computer Science Department, College of Computer and Mathematics Science, University of Mosul, Mosul/Iraq

ABSTRACT

An algorithm which generates a digital image representing an estimate of the difference between two identical images is described which depends on image subtraction using 8-bit logical exclusive-or operation. The process first convert both input images into binary image then apply 8-bit logical exclusive-or operation to both binary images, the output image will represent the defect between both images, the output image is highlight by red colour and add the result to source image one.

Keywords: Change Detection, Image Subtraction.

1. INTRODUCTION

In many computer-vision usages Change detection among two identical images is an essential and serious task .it can be used in different application of images type including remote sensing, surveillance, medical diagnosis and treatment, civil infrastructure, underwater sensing and geographical environment, which identifying the missing regions in one image corresponding to visible or invisible objects, objects motion or shape changes[1]. An easy and general method for finding the difference between the two images is image difference calculation, it can be done by finding the absolute subtraction between each opposite pixel.

If the two images are identical, a blank image is created if the difference calculation of each pixel hold zero value of RGB (0, 0, 0) as an intensity, otherwise the images are light up. This is where the easy part ends and the hard part begins [2][5].

The paper is organized as follows: in section 2, I explain the Image subtraction Using 8bit exclusive-OR Operator; in section 3, I describe the methodology presented in this paper. In section 4, I demonstrate the result of the method, in section 5 I demonstrate the conclusion of the method.

2: IMAGE SUBTRACTION USING 8BIT XOR OPERATOR

Image subtraction is a change detection method used to determine changes between images. The difference between two images is calculated by finding the absolute difference between each pixel in each image, and generating an image based on the result [2][3]. Like this

5	9	1	1	1	3
2	5	1	2	2	5
1	3	3	5	3	3
2	3	2	7	3	1
2	5	1	2	2	5
3	2	1	1	5	2

5	3	25	28	3	3
2	8	28	9	13	5
1	3	3	5	3	3
2	3	2	5	3	1
2	8	28	9	13	5
3	23	21	19	5	2

0	6	24	27	2	0
0	3	27	7	11	0
0	0	0	0	0	0
0	0	0	2	0	0
0	3	27	7	11	0
0	21	20	18	0	0

Fig. 1: Example of image differencing

An image subtraction algorithm using 8bit XOR arithmetic or logical Operator is used to detect difference between two identical images. An arithmetic operation between images is a pixelby-pixel transformation which compared both images using exclusive-or operator and produces an image which shows only the difference between the two images.

The subtraction of two images is performed using this equations:

$$Output(i,j) = Image1(i,j) \wedge Image2(i,j)$$

Where image1,image2 are the input images , and Output is the result (output image) if the pixel1 of image1 is not equal to pixel1 of image2 then there will be defect which represented by white colour ,otherwise there is no defect which represented by black colour. The following table show the Logical XOR Operation Truth Table [1][4][5].

Table 1: Logical XOR Operation Truth Table.

Pixel (Image 1)	Pixel (Image 2)	Pixel (Output Image)
0	0	0
0	1	1
1	0	1
1	1	0

3. THE METHODOLOGY

1. Load two input images from computer , Input Image1[r,c] and Image2[r,c]
2. Convert the Image1[r,c]& Image2[r,c] to a binary image which B1[r,c]& B2[r,c].
3. For all pixels[r,c] in the input images apply 8-bit XOR pixel by pixel operation in all pixels in the Binary Images .
 $I_{out}[r,c]=0$ if $B1[r,c] = B2[r,c]$.
 $I_{out}[r,c]=1$ if $B1[r,c] \neq B2[r,c]$.
4. Hight light the Iout image and add the result of this step to image1[r,c]

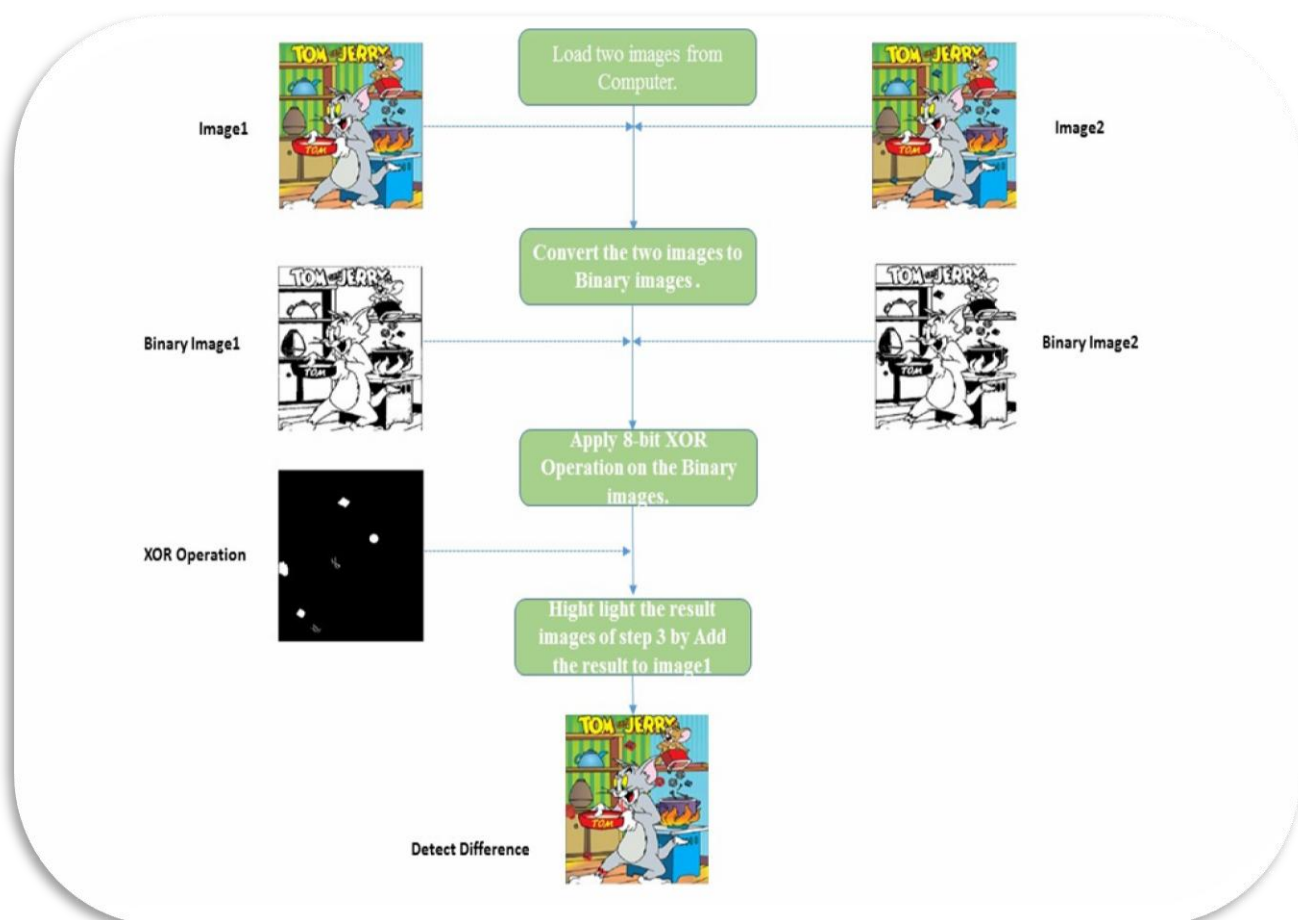


Fig .3: Block Diagram of Methodology

4. RESULTS

Now we present an examples from which are show the difference between image ; see figures below :

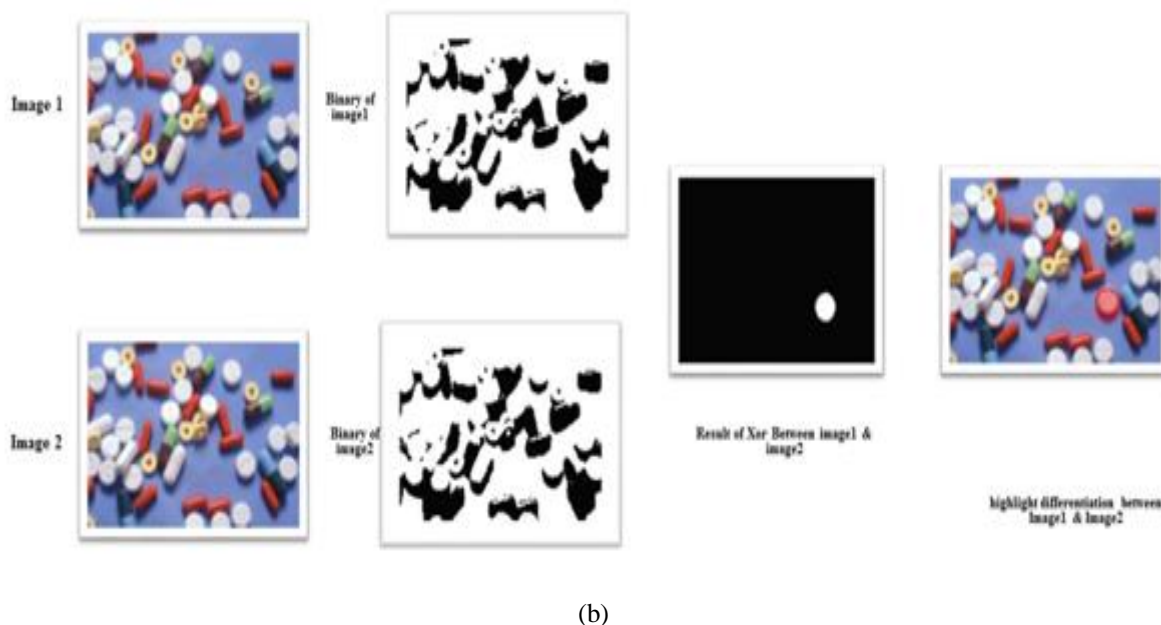
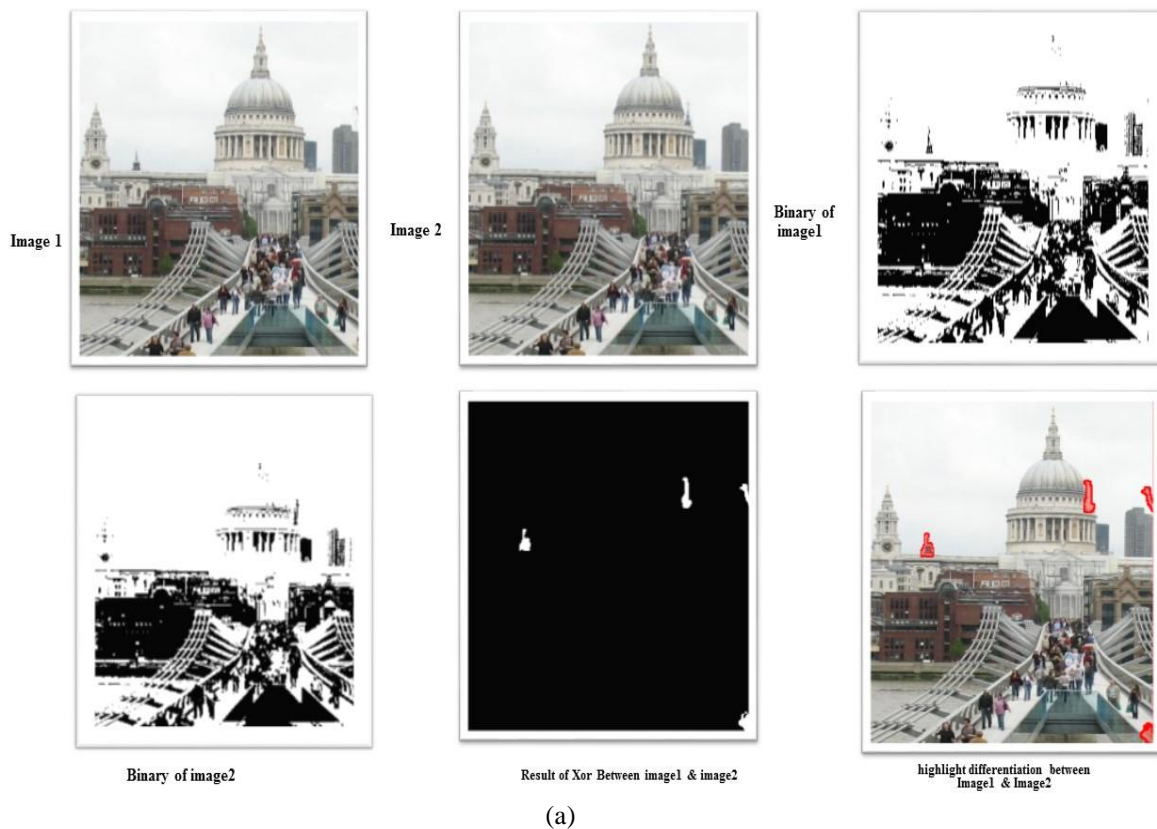


Fig .4: Example of image subtractions using 8 bit exclusive-or logical operation

CONCLUSION

In the present paper, change detection is detected by the method of image subtraction with 8-bit exclusive-or logical operation, which find out the difference between two images and show you which pixel is different between two identical looking images. Any person can find the differences between two identical images by his eye, but sometimes those differences are embedded and takes a lot of time to be noticed or cannot be noticed , using method to make the comparison and specified the differences make such operation rapid and accurate. A good performance and efficiency of the method is showed in the experiment

REFERENCES

- [1]. Suhasini A, Prathiksha B G, Sonal D Kalro, Meghashree B S, and Phaneendra H D, 2015 , “PCB Defect Detection Using Image Subtraction Algorithm”, International Journal of Computer Science Trends and Technology (IJCST) - Volume 3 Issue 3, May-June 2015.
- [2]. JEC Jaipur , PPG Scholar and Associate Professor, JEC Jaipur , “PCB Fault Detection by Image Subtraction Method” , International Journal of Scientific Engineering and Applied Science (IJSEAS) - Volume-2, Issue-1, January 2016, ISSN: 2395-3470 www.ijseas.com
- [3]. Singla Nishu, “Motion Detection Based on Frame Difference Method “ , International Journal of Information & Computation Technology. ISSN 0974-2239 Volume 4, Number 15 (2014), pp. 1559-1565.
- [4]. Sarath N.S, Anoop K. P and Sasi Kumar V. V. , “A Review of PCB Defect Detection Using Image Processing “ , ISSN: 2277-3754 , International Journal of Engineering and Innovative Technology (IJEIT) Volume 4, Issue 11, May 2015.
- [5]. Gonzalez Rafael C. and Woods Richard E., (2008), “*Digital ImageProcessing*”, Prentice Hall, Inc., 3rd edition.