Designing Red Eye Reduction Software with Intensity Color Checking Technique

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Abstract. Photographs either with a regular camera or a digital camera where taken from high lighting on people, often producing red spots on the pupils of the eye with the term red eye. This can cause the photo results are not good. With certain software that functions as an image processor, it can easily remove the red eye using only a tool called red eye reduction. So with the existence of the program the results of photos with digital cameras can be edited to eliminate the red eye effect before printing. Red eye reduction used the intensity color checking algorithm in the process of replacing red image pixels and then replacing them with grayish black color according to the process of intensity produced. In this paper program implemented can reduce red eye with the intensity color checking algorithm by processing certain selected regions. The image results can then be printed or saved again in a bitmap format.

1. Introduction

Photographs either with a regular camera or a digital camera where taken from high lighting on people, often producing red spots on the pupils of the eye with the term red eye. This of course causes the photo results are not good.

Red eye is a common problem for photographers who use flash [1][2]. Fortunately, the red eye whose caused by very predictable conditions and can be easily avoided with a little careful preparation. Basically the red eye is caused by a reflection of the inner light of the person's pupil and returning to the camera. In order to better understand this concept, first need to know a little thing about how the human eye works. In the human eye, the pupil is an expanding part and contracts to allow various levels of light to enter their eyes. Pupil allows human to see clearly whether someone is walking outside on a sunny day or walking in the moonlight. So, when an image was taken with flash in low light, the pupil cannot close fast enough to block light, so the flash reflects all the way behind the eye and shoots back into the camera [3][4][5].

The easiest way to avoid red eye first place is to avoid situations where you have to use flash in low light [6]. But if you can not avoid it, being able to use photo editing software to remove red eyes only takes time to erase them, especially if you have lots of pictures to do [7].

With certain software that functions as an image processor, it can easily remove the red eye using only a tool called red eye reduction. So with the existence of the program the results of photos with digital cameras can be edited to eliminate the red eye effect before printing because of everyone definitely
wants good photo quality without any defects. The problem that arises is that photos that have been made are not possible to be photographed again, so we need software that can eliminate red eye [8].

2. Related Works
Image processing is a process of input images to produce output images as desired, where in the process, image processing involves manipulation of pixels from an image to form another image [9]. Different types of operations may be applied to the pixels of the original image to produce a new image.

3. Research Methodology
3.1. Design Stage
This application was designed using the waterfall methodology where the explanation of these steps is as follows[10]:

a. Data Collection
In this section data collection was carried out primary theories and materials related to the topics discussed.
b. Analysis
In this section, an analysis is carried out regarding the workings of red eye reduction which are expressed in the form of calculation examples and understand how the algorithm works.
c. Designing the Interface
The interface design is done to design the user interface for functions as mentioned above. The interface design will be done directly in the IDE (Integrated Development Environment) of Visual Basic 6.0.
d. Testing
Used to carry out tests on programs designed and if there where errors, corrections will be made. The method for testing in this program was done by testing a number of input files. If errors are found, the program will be re-checked to determine errors in terms of implementation.

3.2. Functional Requirements Analysis
Analysis of functional requirements is a process of identifying what facilities and activities are contained and carried out by a system designed. Functional requirements of the system here are the types of needs that contain what processes are carried out by the system. The functional requirements of the system designed are:

a. The need for read image files as input where this can be done using the standard Save / Open common dialog of the Windows operating system [11].
b. The need to display input to screen images so that users can distinguish between input images and processed images. For this purpose, several visual picture box objects are needed, which function as a picture box, the input image viewer, the place to hold the processed image and the display for the output image.
c. Process buttons are used to select image files, preview images, process buttons to do red eye removal and compare the results of images with input images. For this purpose you can use the process button by using the command button object. [12]
d. Output image results use the JPEG format so that the image size is smaller when compared to the bitmap image.

4. Result and Discussion
4.1. Design
Software design eliminates the red eye effect in photos ranging from designing software interfaces, compiling visual components, designing dialog boxes, and writing program code. In the design section it will contain an explanation of the design of the program. The program was designed using Visual Basic version 6.0 Professional Edition and can also be opened and compiled with Visual Basic version
5.0. The interface of this program is a window shaped form. The form designed consists of two forms, namely the Splash Screen form and the Main Form.

The red eye reduction program designed consists of two parts, namely the first part using techniques to replace certain colors while the second technique is to calculate the intensity of the color where the second result will be obtained with the photo red eye removed finer. In general, in the code for making OCX csXImage components a function will be formed named RedEyeReduction. For calls in Visual Basic, the function must be declared in the module stored in the * .BAS extension first.

4.2. System Implementation
This program did not require a special installation method, arguing that all files needed by this application can be compiled into one executable file. For install this program is easier by copying the executable file (RedEyeRemoval.EXE) into the selected folder location on the hard disk. If the program cannot be executed, do the installation by running the SETUP.EXE file.

To use this program, run the executable file (RedEyeRemoval.EXE) from the location where the file was copied, or if the program is installed, the program shortcut icon can be run from the Start button → Windows program. After that, if the program starts, it will look like the picture 1 below

![Program Display](image)

**Figure 1.** Program Display

Try to use the program that has been generated, the first step is to load an image file. The file can be in the form of BMP, GIF, JPEG, TIF, WMF. Because this program functions to eliminate the red eye that is usually found in the eyes, this trial will use images that have a red eye. For that the user can load the image by selecting the File menu → Open and the next dialog box will appear to open the image file as shown in Figure 2 below.
After that to make the process of zooming in or zooming out easier to select the part containing the red eye can use both zoom buttons. After that the user can select the combo box in the form of a "Red Eye Reduction" option. The following options will appear as shown in 3. Next click on the "Select" button and select the image section containing the red eye and then press the "Apply" button to remove the red eye. Select the "Cancel" button to cancel the last process.

To print it can be done by selecting on the File menu → Print. After that a printing dialog will be displayed like Figure 4. In this dialog there is an option to choose the type of printer that is active on the system and the size of the paper through the paper size option. In addition, there is also an option whether to print horizontally or vertically. Determining the distance of the upper left position and the printing unit can be set in the next option. The number of copies can be specified in the "Copies" section and the printing scale can be selected via the "Scale" option. [14]
Figure 4. Display Printing Dialog

The next option is "Fit to Page" which is used to print all images with adjustments based on paper size. The "Center on Page" option is used to print images on the center of the paper. After all the choices are determined then press the "Print" button to print and the "Cancel" button for cancellation.

5. Conclusion

From the results of testing that has been done on the program, some conclusions can be drawn as follows:

1. Software that was designed can be used to eliminate the red eye that is often produced in image shoot using a camera.
2. By using the intensity color checking technique, the process of changing the red color on the red eye of the image looks smooth and nice.
3. This red eye reduction section can only be applied to a region of a certain point in the image by inputting a radius from the point to determine the area to be removed by the red eye.

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