

HỒ CHÍ MINH CITY NATIONAL UNIVERSITY
HỒ CHÍ MINH CITY UNIVERSITY OF SCIENCE



REPORT

PROJECT #2

Subject: Applied Mathematics and Statistics for Information Technology

Practical Instructor: Phạm Thị Phương Uyên

Topic: Image Progressing

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Class: 21CLC08

I. Feature

Task ID	Task Name	Completed
1	Adjust Brightness	✓
2	Adjust Contrast	✓
3	Flipping image in horizontal / vertical mode	✓
4	Converting image into gray/sepia format.	✓
5	Blur/Detail	
6	Cutting image by given size	✓
7	Cutting image in circle	✓

II. Implementation Ideas

1. Adjust Brightness.

- Adding (R,G,B) of the pixel of the image array with –brightness factor—to increase or decrease the brightness of the image

2. Adjust Contrast

- Multiplying (R,G,B) of the pixel of the image array with the –contrast factor—to adjust the contrast of the image.

3. Flipping image

- Swap left side of the image array with the right side (n/2 vector from the left/right of the array size n)(vector $n \leftrightarrow$ vector 1, vector (n-1) \leftrightarrow vector 2, vector (n/2) \leftrightarrow vector ((n/2)-1) by horizontal)
- Swap upper side of the image array with the lower side (n/2 vector from the upper/lower of the array size n)(vector $n \leftrightarrow$ vector 1, vector (n1) \leftrightarrow vector 2, vector (n/2) \leftrightarrow vector ((n/2)-1) by vertical)

4. Converting image into gray/sepia

Gray Conversing

- Defining new image in type “L” with the same size of the given image, setting each pixel of the new image array = average of the (R,G,B) of each pixel of given image.

Sepia Conversing

- Defining new image in type “RBG” with the same size of the give image, setting each pixel of the new image array by R,G,B of the given array.

- $\text{newR} = 0.393\text{R} + 0.769\text{G} + 0.189\text{B}$
- $\text{newG} = 0.349\text{R} + 0.686\text{G} + 0.168\text{B}$
- $\text{newB} = 0.272\text{R} + 0.534\text{G} + 0.131\text{B}$

5. Blurring Image

6. Cutting image by size

- The size that the user enter is % amount of pixels of given image then the function will calculate the amount of pixel in width and height.
- Calculating the height padding and width padding by the recipe :

$$padding\ height/width = \frac{(given\ image's\ height/width - new\ height/width)}{2}$$

- Then copy each pixel of the given image to new image, start at width/height padding and end at padding + width/height

7. Cutting image in Circle.

- The diameter of the circle image is the min of the height or the width of the given image, then divide it by 2 to get the radius.
- Then calculating the padding like “cutting image by size” , the size = min(height,width) so one of the paddings is zero (no padding).
- Then copy each pixel of the given image to new image, start at width/height padding and end at padding + width/height but calculate the distance from each pixel to the center of the image (width/2 and height/2). All the pixel that have the distance from center > the radius, that pixel will be black ([0,0,0]).

III. Achievement

1. Change brightness



2. Change Contrast

// *Contrast Factor = 100*



3. Flipping Image.

//In horizontal



// In Vertical



4. Gray/Sepia scaling

//Gray scaling



//Sepia scaling



5.

6. Cutting by size

// 60%



7. Cutting in circle



IV. References

1. [*Image Processing Algorithms Part 5: Contrast Adjustment | Dreamland Fantasy Studios \(dfstudios.co.uk\)*](#)
2. [*Image Processing Algorithms Part 4: Brightness Adjustment | Dreamland Fantasy Studios \(dfstudios.co.uk\)*](#)
3. [*Xử lý hình ảnh bằng Python \(koodibar.com\)*](#)
4. [*Kernel \(image processing\) - Wikipedia.*](#)

The End.