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Compression of Color Image Using Quantization Method

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Keywords

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Abstract. The development of large-capacity storage media causes people to no longer have problems if they have large files. More so if the file we have is an image file. Nevertheless, sometimes the large file size feels annoying if we have to manage the storage media that we have for various data, thepurpose of this study is to compress color imagery. By using quantization method can be taken, By using data compression then the data capacity will be minimized, Utilization of quantization method will facilitate data compression (image), Image compression with kunatization method in RGB Image can reduce thesize of the compressed file, so as to save storage space(Storage).

1. INTRODUCTION

The development of large-capacity storage media causes people to no longer have problems if they have large files. More so if the file we have is an image file. However, sometimes the large file size feels annoying if we have to manage the storage media that we have for various data [1], [2]. Especially if the file will be sent electronically, of course the capacity of the file becomes a problem in itself. Image compression is the process of minimizing the number of bits that represent an image so that the image size becomes smaller. Basically image compression techniques are used for data transmission and storage. Image compression is widely applied to television broadcasting, remote sensing, military communication, radar and others [3].

Nowadays the use of RGB imagery (Read, Greed, Blue) is already a necessity in various fields. However, its use is constrained by large file capacity, but it is possible to compress the imagery according to your needs. RGB imagery is a 3-dimensional matrix, i.e. length dimension, width dimension and RGB dimension. If further parsed, three two-dimensional matrices will be obtained, call it R matrix, G matrix, B matrix. With quantization methods, the R matrix, G matrix and B matrix will be reduced in tier, resulting in the number of bits used to represent the image to be reduced. As the number of bits decreases, the file size becomes smaller. The quantization method belongs to the Lossy Compression category, so the compressed image cannot be decompressed again as it was because of missing information [4], [5].

To solve the problem above one of the solutions is to compress the information data so that it is smaller than the original size without reducing the content of the data. Thus, various algorithms were created regarding data compression. Data compression algorithms that are lossy and lossless have been widely known and researched. Similarly, the development with lossless compressionalgorithm, which for this type of algorithm is used for the purposes of transferring important data that requires no data loss. This has given rise to a variety of new lossless algorithms that have diverse performance and quality [6].

2. METHOD

2.1 Image Data Encoding in RGB

Data is stored in the computer on the main memory for processing. A character of data stored in the main memory occupies a position of 1 byte. On the first generation computer, 1 byte consists of 4 bits, the second generation computer, 1 byte consists of 6 bits and on the current generation computer, 1 byte consists of 8 bits. A character of data stored in main memory is represented by a combination of binary digits (binary digits or bits). A binary code can be used to represent a character[7]. A different computer uses different binary code to represent a character. A 1-byte computer consists of 4 bits, using binary code in the form of a combination of 4 bits, namely BCD (Binary Coded Decimal).

Computers that use 6 bits for 1 byte, using binary code consisting of 6 combinations of bits,

namely SBCDIC (Standard Binary Coded Decimal Interchange Code). A computer consisting of 8 bits, using binary code consisting of a combination of 8 bits, namely EBCDIC (Extended Binary Coded Decimal Interchange Code) or ASCII (American Standard Code of Information Interchange) [2].

2.2 Digital Imagery Basics

Digital imagery is a two-dimensional image that can be displayed on a computer monitor screen as a diskretic set of digital values called pixels (picture elements). A pixel is an image element that has a value that indicates the intensity of color.Based on how it is storeed or built, digital imagery can be divided into two types. The first type is a digital image formed by a collection of pixels in a two-dimensional array. This type of image is called a bitmap image or raster image. The second type of imagery is an image formed by geometric and mathematical functions. This type of image is calledvector graphics. Digital imagery (discrete) is produced from analog imagery (continuous) through digitization Digitalization of analog imagery consists of sampling and quantization (quantization) Desecration is the division of imagery into discrete elements (pixels), while quantization is the giving ofvalue, color intensity on each pixel with a value that is an integer. The amount of value that can be used in image quantization depends on the pixel depth, which is the number of bits used to represent the intensity of pixel color. Pixel depth is often referred to as color depth. Digital images that have a pixel n bit depth are also called n-bit images. Based on the constituent colors, digital imagery can be divided into three kinds: Binary image, which is an image consisting of only two colors, black and white. Therefore, each pixel of the binary image is simply represented by 1 bit [8], [9].

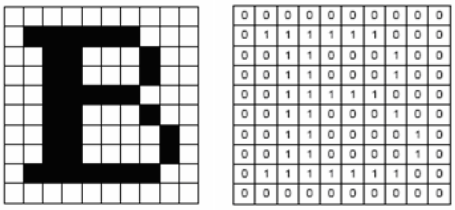

Figure 1. binary imagery and Image representation

Although color imagery is currently preferred because it gives a richer impression of binary imagery, it does not make binary images die. In some applications binary imagery is still needed, for example the image of the agency logo (which consists only of black and white), the image of the goods code (bar code) listed on the label of the goods, the image of the scanned text document, and so on. As mentioned above, binary imagery has only two grayish degree values: black and white. Pixel – object pixel is 1 and pixel – background pixel is 0. at the time of displaying the image, is white and 1 is black. So in binary image, the background is white while the object is black as shown in figure 2.1 above. Although computers today can process both grayscale and color imagery, binary images are still maintained [10].

3. RESULTS AND DISCUSSION

Quantization-based compression uses a method of reducing the amount of color intensity, thus reducing the number of bits used to represent an image. This compression is lossy, as the intensity of the color is reduced.

Figure 2 Image to beused

3.1 Quantization Compression Algorithm

Quantization compression algorithm is to find the size of the image matrix and look for the degree value of R,G,B image to double as follows :

```
Compression = gblama =imread('famili.jpg');
[m,n,o]=size(gblama);
array=double(gblama);
gbbaru=zeros(m,n,3);
      for k=1:o
        for i=1:m
        for j=1:n
     if (mod(array(i,j,k),2)==0)
        imagenew(i,j,k)=(array(i,j,k)+1)/2;
    else

         imagenew(i,j,k)=(array(i,j,k))/2;
        end
      end
 end
 end
```

The steps to determine the fiqh or image as follows:

Step 1 ;
Number of image pixels = 80
Grayish degree = 256 (24 bits)
Then the histrogram:

Table 1 RGB Color Histogram Table

Degree of Grayness	Number of Pixels of Color R	Number of Pixels of Color G	Number of Pixels Color B
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	1
5	0	0	0
6	0	0	1
7	0	0	0
8	0	0	0
9	0	0	2
10	0	0	2
11	0	0	0
12	0	0	0
13	0	0	1
14	0	0	0
15	0	0	0
254	0	0	2
255	0	0	4

Step 2 :
For example, it will be compressed from 256 to 128 degrees grayish (7 bits) i.e. grayish value 0 to 127, then made n group fruit that is 128. Each group has an average of 80/7 = 11.42 pixels (can be less)

Table 2 New Grayish Value Grouping

K	Gray	Pixel R	Pixel G	Pixel B	P-KR	PK-G	PK-B
1	0	0	0	2			
	1	0	0	0	0	0	2
2	2	0	0	0			
	3	0	0	0	0	0	0
3	4	0	0	1			
	5	0	0	0	0	0	1
4	6	0	0	1			
	7	0	0	0	0	0	1
5	8	0	0	0			
	9	0	0	2	0	0	2
6	10	0	0	2			
	11	0	0	0	0	0	2
7	12	0	0	0			
	13	0	0	1	0	0	1
8	14	0	0	0			
	15	0	0	0	0	0	0
9	16	0	0	1			
	17	0	0	0	0	0	1
10	18	0	0	0			
	19	0	0	0	0	0	0
11	20	0	0	0			
	21	0	0	0	0	0	0

Step 3 :
Each pixel or image in the group is encoded with a new gray value of 0 to 127

Table 3 New Coding Group Table

group	Old Gray Value	New Gray Value
1	0	0
	1	
2	2	1
	3	
3	4	2
	5	
4	6	3
	7	
5	8	4

	9	
6	10	5
	11	
7	12	6
	13	
8	14	7
	15	
9	16	8
	17	
10	18	9
	19	
11	20	10
	21	
12	22	11
	23	

Image that has been compressed with the following matrix:

Matrices R:

100	119	123	120	35	61	27	53	106	40
35	107	125	111	110	97	67	48	65	113
108	113	111	125	90	58	89	123	100	94
94	96	107	99	77	97	92	46	94	109
115	63	60	54	31	42	112	125	117	64
60	53	24	66	117	125	124	124	124	124
124	124	124	124	124	124	124	124	124	124

Matrices G:

3	42	58	48	39	26	56	86	22	39
91	85	77	84	84	88	28	39	83	99
81	70	94	97	69	78	50	30	78	74
88	100	72	87	73	28	33	40	36	89
75	78	83	76	46	60	75	77	76	67
50	47	69	88	86	77	74	66	45	52
71	89	92	92	92	92	92	92	92	92
92	92	92	92	92	92	92			

Matrices B:

36	53	62	56	0	69	69	50	38	53
31	31	12	26	39	58	83	93	13	5
4	2	19	55	127	117	25	16	3	6
0	39	127	72	4	12	8	6	5	16
127	93	46	39	64	23	22	31	127	127
126	126	77	18	37	43	127	126	125	118
53	18	36	44	44	44	44	44	44	44
44	44	44	44	44	44	44			

Compression ratio = $100\% - \left(\frac{128}{256} x100\%\right)$ = **50%,** means that the original image has been compressed as much as **50%**.

4. CONCLUSION

By using quantization method can be taken, By using data compression then the data capacity will be minimized, Utilization of quantization method will facilitate data compression (image), Image compression with kunatization method in RGB Image can reduce thesize of the compressed file, so as to save storage space (Storage).

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