Compression algorithm for images
(Using P2C& P4C Algoritm)

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Abstract: Nowadays data transformation speed, considering the development of information systems has been paid great attention. One method to speed up the data transformation is to reducing the size of data.[1]

Of course the reduction has more other advantages like:[2].
•   Less disk space (more data in reality)
•   Faster writing and reading
•   Faster file transfer
•   Variable dynamic range
•   Byte order independent
In this paper two algorithms for reducing data size have been introduced.
Keywords: Lossy compression, P2C algorithm, P4C algorithm, Image Compression, Data transformation

I. INTRODAUCTION

This paper will investigate two Lossy algorithms for compressing images .in both techniques the size of image will be reduced by eliminating the color variations. In the P2C algorithm two black and white colors and in the P4C algorithm four white, light gray, dark gray and black for a more detailed resolution is used.

II. THE ALGORITHMS

A. *P2C (Picture With Two Colors) Algorithms*

Eliminating the color variations will result a decrease in their size. And this difference between the size of color and grayscale images is the main idea of the algorithm. Here is a typical example:

Figure 1. Color image with the size of 88.7 KB

Figure 2. Grayscale image with the size of 62.1 KB

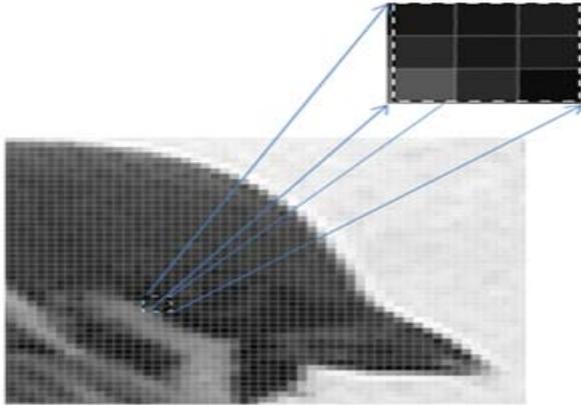The following picture is a part of a grayscale image that shows more than one color is used.

Figure 3. Grayscale image with the size of 62.1 KB

In P2C algorithm each pixel will be shown by one bit (0&1). The 0 is for white and the 1 is for black. Therefor the image size in this algorithm is calculated by multiplying the number of vertical and horizontal pixels with the following formula:
The file size= the number of vertical pixels × the number of horizontal pixels(1)

The output of the algorithm:

Figure 4. A compressed image by the P2C algorithm

B. The P4C(Picture With Four Colors) algorithm

In the P4C algorithm we use four colors. It means that we need 2bits for each pixels:[3]

Table I.   Color Guide Table

Vertical pixel	Horizontal pixel	color
0	0	White
0	1	Gray
1	0	Dark Gray
1	1	Black

The formula for calculating the size of file:

The file size= the number of vertical pixels × the number of horizontal pixels × 2 (2)

III. THE COMPLEXITY OF THE P2C AND P4C ALGORITHMS

Both compressing and decompressing data algorithms has two for loops

```
for (inti = 0; i< width; i++)
            {
 for (int j = 0; j < height; j++)
            {
//......
            } }
```

Therefor its complexity is OP2C(n2).[4]

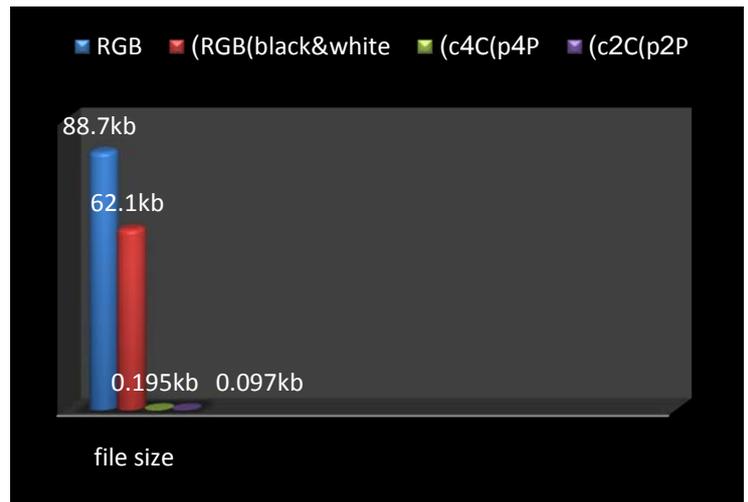## IV. COMPARISON OF P2C AND P4C ALGORITHMS WITH A JPG IMAGE

Figure 5. Comparison chart[5]

The P4C algorithm allows us to have an image just for displaying the existing objects by increasing and decreasing the brightness elimination in the program. In the following picture you will see a satellite image from a military environment which is compressed with the P4C algorithm. Military helicopters, cars and buildings is visible in the picture
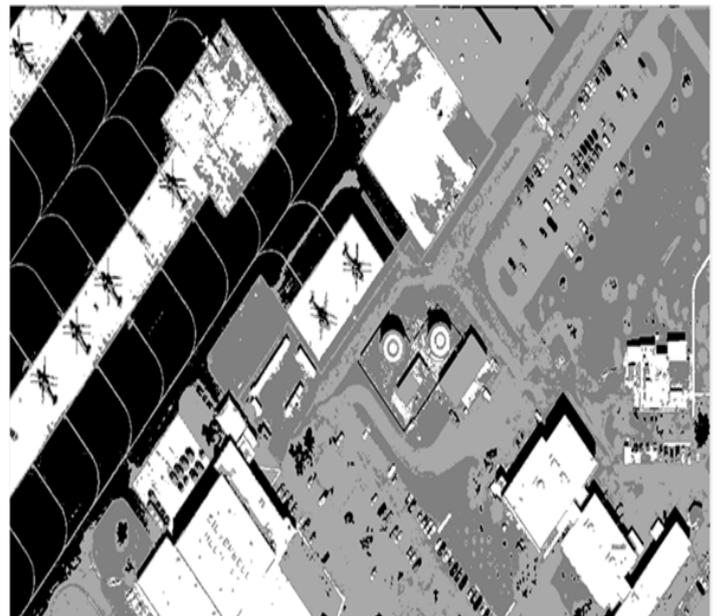
Figure6. A compressed image by the P4C algorithm

The below table is used for compressing the above picture

Table II.   Brightness level table[6]

Brightness level	color
x>0.81 && x <0.99	White
x>0.61 && x <0.80	Gray
x>0.31 && x <0.60	Dark Gray
x>0.00 && x <0.30	Black

V.   REFERENCES

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