https://gospodarkainnowacje.pl
GOSPODARKA I INNOWACJE
LABORATORIUM WIEDZY Artur Borcuch
Volume: 45 | 2024
Economy and Innovation
ISSN: 2545-0573

Encoding Graphic Information

Mavlyanov Muminjon Akramovich
Teacher of the Department of Exact and Natural Sciences
Gulistan State Pedagogical Institute
e-mail: muminjonmavlyan@gmail.com

A R T I C L E I N F O.

Keywords:

graphics, coding, information measurement units, raster, pixels, RGB

Abstract:

Since man is part of being, he always feels the influence of being. We perceive this effect in the form of various signals (sound, light, electromagnetic, nerve, etc.). Information that has a continuous effect on a person is called analog information. A person uses various designations to collect information, process it, be convenient. In this article, we will consider encoding graphic information, which is such a type of information.

INTRODUCTION

Information is also a very different concept (e.g.: time, work, temperature, distance, etc.) as measured. But its unit of measurement is different from the units of measurement in the course of Mathematics or physics.

Since characters in information are encoded on the basis of binary numbers, the term bit is used for a single discharge (room) of the code. The term is derived from the letters in the English "binary digit" expression of the phrase "binary numbers". For example, it is believed that there are 3 bits in 011, 2 bits in 01, and 8 bits in 01000010. If we take into account that each binary number is an informational signal for a computer, then we determine that the number 0 or 1 is a 1-bit Information carrier. In this case, we consider each binary number to have the same information weight, that is, the same amount of information carrier. This approach to measuring information is called an alphabetical approach. In the alphabetical approach, a bit was adopted as the smallest unit of measurement of the amount of information.

In this article, we will consider encoding graphic information.

MAIN PART

Image processing is a method of computer-aided analysis and control of digital images using mathematical operators. In image processing, it is mainly carried out primarily in digital images. That is, it can have a set of results, either an image, or a set of image parameters. This area cannot be studied without knowing the human visual system. The fact that a template is obtained from the human visual system makes a huge contribution to the development of the field of digital processing of images.

When changing the image size, a loss of a certain part of the signals is observed when the image size in general is changed. Images are coordinated using interpolation techniques to recover them. This serves to provide the recipient of the solution with plausible alternative variants of the images.

Factors such as the nature of technical devices receiving data and the light levels at the time of imaging have different effects on image quality. It is necessary to improve it if the image quality is poor. Because, in non-qualitative images, it is difficult to find the elements of the object or human face under study. There are various ways to improve image quality in such cases.

When we look at a computer monitor in some program, for example, drawing a paint picture and then enlarging it, it can be seen that the picture is formed in the form of a square cell. This is due to the fact that the images on the computer screen are organized from very small squares, which are called pixels, divided using the so-called raster lines. This means that as long as the image is depicted on the computer using pixels, i.e. discerning a smooth picture.

The development of Information, its processing, as well as the establishment of connections between graphic objects and non-graphic objects to fairies have been taken to be computer graphics in Informatics.

The organization of copier graphics is divided into 3 groups:

1.Rastor;

2.Vector;

3.Froctal.

A raster graph is said to be a planar geometric shape described by a set of points (pixels) that have the same size and dimensions as points (pixels). These shapes are colored in one way or another, and these colors are encoded by the numbers with a fixed charge. The main disadvantage of Point images is that they have a fixed size, and the lack of an internal structure causes them to distort image visibility when enlarged or scaled down.

Vector images are said to be a set of geometric objects that are structurally more complex and have different views. Examples of such objects include straight Four Corners, circles, squares, ellipses, avalanches, and incisions. One of the characteristic features of vector graphics is the assignment of control for each object in it, which changes their appearance.

Fractal graphics are not drawing or painting an image, but it can be created on the basis of programs based on mathematic calculations. Fractal graphics are commonly used in function graphing, fuchsia and Object 3-dimensional graph drawing, and game application creation. In Fractal graphics, the images are generated at the cost of changing the values of the functions and equations, while the mathematic function and the management of it are built on the basis of the equations. Fractal graphics includes all application packages (Delphi, C, C++, Piton, Java and others) as well as a graph drawing mathematic application package (Math lab, Mathcad, geometry and others) applications.

Image size and colors in computer graphics.

In computer graphics, the concept of a color module is used when working with colors. In the picture, the color data is determined using the encoding method and is related to how many colors are represented on the screen at the same time. Using one byte for colors, separating one byte, allows encoding 256 different colors from their combination. Two bytes, on the other hand, allow 65,336 annual color encodings.

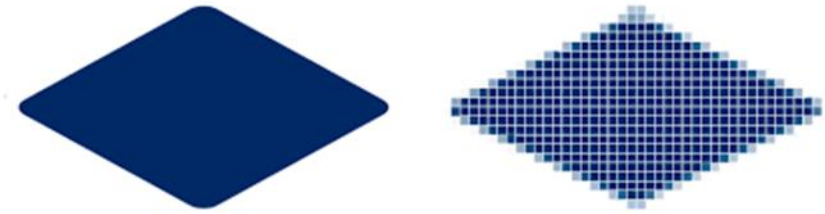

Figure 1. View image in pixels

Now we define a binary code consisting of only two colors, for example white and black. To do this, we put 0 on the white color of the Pixel 1 on the Black color, that is, for two colors there will be enough code with a length of 1 bit.

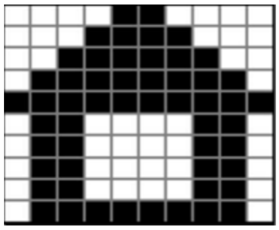

Figure 2.

We can write Figure 2 in the black – and-white image above as follows

00001100000000111000001111110001111111110…..

If the color of the pixels is more than two, then it will be 1 bit less for curing. In order to encode in binary when the number of Colors is large, we refer to the new formula:

$\boldsymbol{N = 2^i}$**,**

Where N is the number of colors to be encoded, i is the depth of colors.

Using these formulas, we can determine the size of the graph axbarot. But the number of colors in the image can be 5, 6 , 7 129, 55, now there is a difficulty in obtaining a result from the above formula, in such cases we refer to the following formula:

$$\boldsymbol{2^{i-1} < number\ of\ colors\ \leq 2^i}$$

From this formula for 3, 4 colors i=2, 5 and 6, 7... for color i=3, 17, 18....we can easily determine that I=5 for 32 colors.

If the capabilities of the monitor screen are known to us, then the information image on the screen can be determined by the volume of information.

Example:

If the screen size is 1920 to 1080 (1920 pixels to the horizon and 1080 pixels to the vertical), only 4 different color images will be displayed on the screen. Determine the information size of the screen.

Solution:

Since the image consists of 4 colors, the color depth of each pixel is:

$$\boldsymbol{N = 2^i}$$

From the formula comes 4=2i i=2, from which 2 bits of binary code per 1 pixel is sufficient. Then the volume of information on the full screen:

1920 / 1080 / 2 bits=4147200bit=518400byte=506.25 bytes.

Answer: 506,25 bytes

Scientists believe that the human eye consists of 3 sensory receptors – red, green and blue, other colors are reflected on the basis of the harmony of these colors. For this reason, red, green, and blue are used to represent an optional color in Compu TER, and the color generation device is known as the RGB (Red, Green, Blue) model. The device of the RGB model is able to produce not only each red, green and blue color itself, but also these colors with different levels of clarity.

If the point consists of white, then there are colors in it, which will be complete and clear. Therefore, White is encoded by three full bytes 255,255,255. Black does not have all available colors (R-red, G - Green, B-blue), meaning that the total set of colors will be zero. Black is encoded by 0.0.0. Gray has a set that makes up total colors, which are the same and neutralize one. For example, Gray can be encoded with 80,80,80 or 120,120,120. It can be seen that the second-state encoding has a high degree of accuracy and clarity, that is, coding with 80,80,80 is almost lighter than coding with 120,120,120. In the case of red, the total color organizers other than red will be zero. For example, dark red is encoded in 125.0.0 or light red in 255.0.0.

From the formula comes 4=2i i=2, from which 2 bits of binary code per 1 pixel is sufficient. Then the volume of information on the full screen:

1920 / 1080 / 2 bits=4147200bit=518400byte=506.25 bytes.

Answer: 506,25 bytes

Scientists believe that the human eye consists of 3 sensory receptors – red, green and blue, other colors are reflected on the basis of the harmony of these colors. For this reason, red, green, and blue are used to represent an optional color in Compu TER, and the color generation device is known as the RGB (Red, Green, Blue) model. The device of the RGB model is able to produce not only each red, green and blue color itself, but also these colors with different levels of clarity.

If the point consists of white, then there are colors in it, which will be complete and clear. Therefore, White is encoded by three full bytes 255,255,255. Black does not have all available colors (R-red, G - Green, B-blue), meaning that the total set of colors will be zero. Black is encoded by 0.0.0. Gray has a set that makes up total colors, which are the same and neutralize one. For example, Gray can be encoded with 80,80,80 or 120,120,120. It can be seen that the second-state encoding has a high degree of accuracy and clarity, that is, coding with 80,80,80 is almost lighter than coding with 120,120,120. In the case of red, the total color organizers other than red will be zero. For example, dark red is encoded in 125.0.0 or light red in 255.0.0.

In a software system, images are defined and processed by pixels. It mainly processes graphic images with the extension BMP (Bitmap). Each pixel in the image accepts numbers in a hexadecimal or decimal number system. Six cells(space) are allocated for hexadecimal numbers ranging from 000,000 (16) to FFFFFF (16) to accept the color value at the point. In this, the first two cells are allocated for Blue, the next two cells for green, and finally the last two cells for red color values. For example, let the color value at an arbitrary (x, y) Point in the image be 6bc8ad16 (706372510). Where the Blue has a value of 6b16 (10710), the Green has a value of C816 (20010) and the Red has a value of AD16 (17310). Thus we can process graphic images based on the above data

the number of possible colors increases 256 times, namely

1419 256*256*256 = reaches 16777216. This process allows you to store, process and transmit images that do not lag behind colors of a vibrant nature. Colors can be represented using a mixture of three red, green, and blue colors. If we want to encode a dot color using 3 bytes, we will use 1-byte Red, 2-byte Green, 3-byte blue for this. We look at the clarity and clarity of colors depending on its byte value. The larger the byte value, the better the accuracy and clarity of the colors.

Figure 3. The first monitors were works based on 2 levels of clarity (no color = 0, there is color = 1). For these monitors, angular is encoded as follows:

Basic color clarity (RGB)			The resulting color	Color code
Red	Green	Blue		
0	0	0	black	000
0	0	1	blue	001
0	1	0	green	010
0	1	1	sky-blue	011
1	0	0	red	100
1	0	1	ruddy	101
1	1	0	yellow	110
1	1	1	white	111

So, in this case, the color depth is equal to r = 3, the number of Colors is equal to 8 (compare with the triad code).

Issue 2. The whitish image has 8 color scales. The image size is 20 × 25 cm. Screen capability is 600 dots per 1 inch (1 inch = 2.5 cm). How many bytes will the information volume of the image be?

Solution: image size 20 cm • 25 cm = 8 inches • 10 inches = 80 inches 2. 600 pixels per 1 inch are suitable, which means that 1 inch 2 = 6002 pixels = 360000 pixels. Then the image occupied 80 in 2. Information has 80 • 360000 pixels = 28800000 pixels. The color scale is 8, that is, 8 = 23 colors per 1 pixel, which means that the code length for 1 pixel is 3 bits. Then 28800000 • 3 bits = 86400000bit =10800000 bytes = 1054,6875 bytes.

Answer: 10546,875 bytes.

REFERENCES

1. Boltayev B., Mahkamov M., Azamatov A., Rahmonqulova S., Informatika va axborot texnologiyalari. Textbook, – Tashkent:, National encyclopedia of Uzbekistan, 2017 - p. 40-43.
2. Makhkamova, M. U., Aydarov, E. B., Rizayev, O. B. Trends in the use of the pedagogical cluster to improve the quality of information technology lessons. Tashkent: Экономика и социум, 2020, p. 802-804.
3. https://www.findhow.org
4. https://imgonline.org – online color palette.
5. https://www.colorScheme.ru – color system