

**EDUCATION AU PATRIMOINE VIA
LES PARCOURS DE SANTÉ**

**HERITAGE EDUCATION THROUGH
FITNESS TRAILS**



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BASIC PHOTOGRAPHY AND VIDEO WORKSHOP

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DIGITAL IMAGE



Digital Images

A digital image is a numeric representation of a two-dimensional image which allows the storage, transfer, editing and printing through digital means.

Digital images are basically data.

One of the first scanned images.
Produced in 1957, the image shows Walden Kirsch, son of the leader of the team that developed the image scanner.

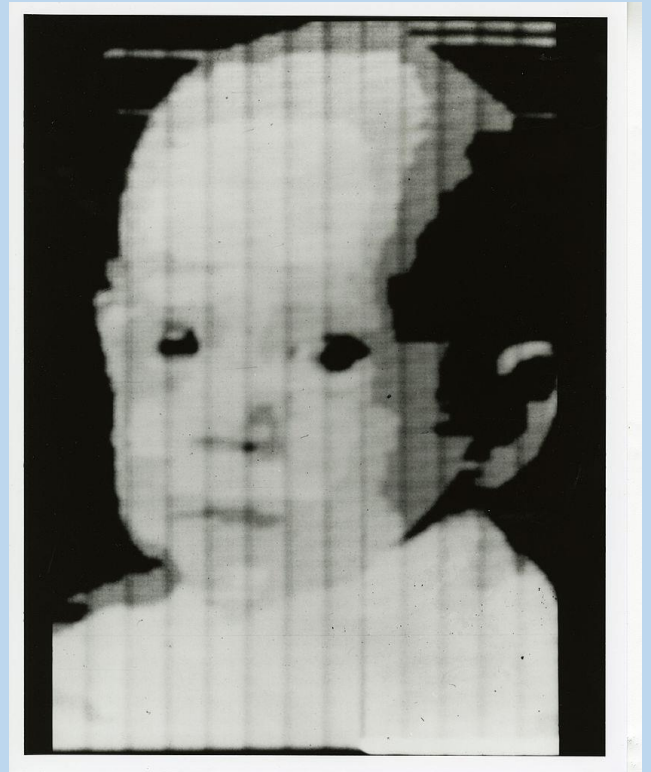
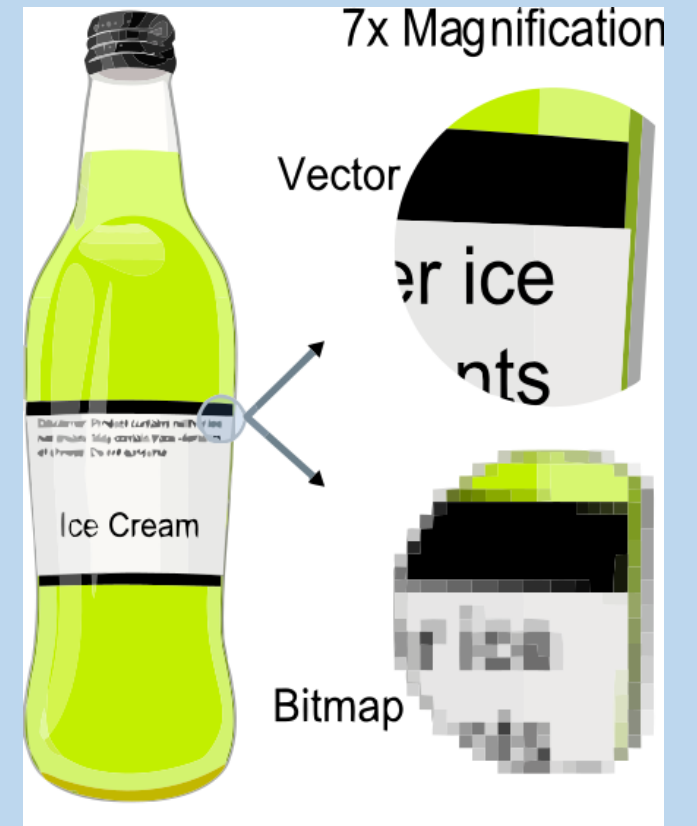


Image Types

We can classify digital in two major categories:

- Vector images;
- Raster images.



Vector images

Vector images resulted from mathematical geometry (vector).

Vector graphics are based on vectors, which lead through locations called control points or nodes. Each of these points has a definite position on the x- and y-axes of the work plane and determines the direction of the path; further, each path may be assigned various attributes, including such values as stroke color, shape, curve, thickness, and fill.

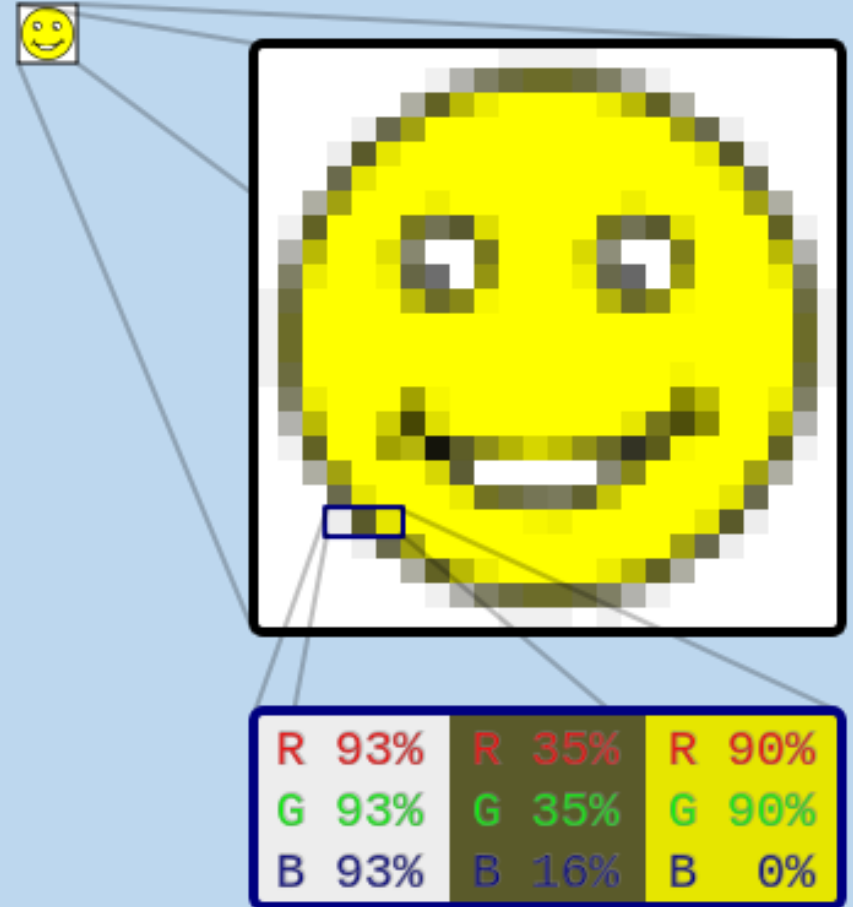


Raster Images

Raster images have a finite set of digital values, called picture elements or pixels. The digital image contains a fixed number of rows and columns of pixels.

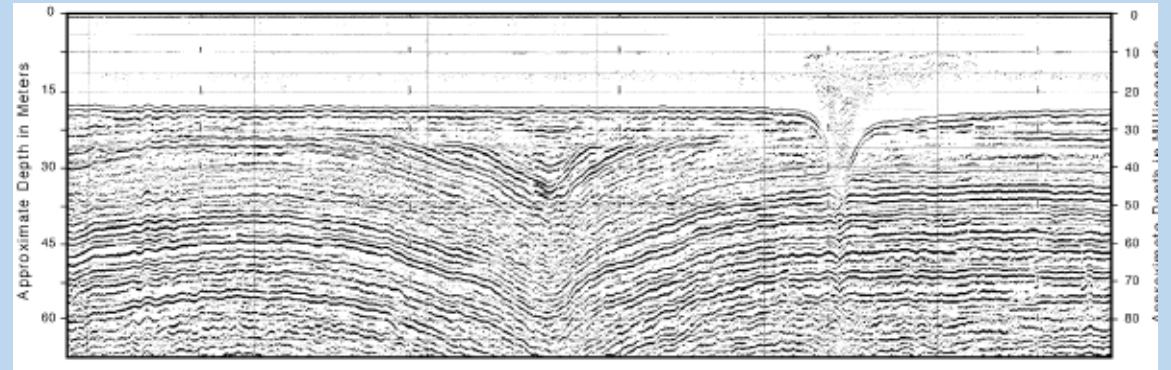
Pixels are the smallest individual element in an image, holding values that represent the brightness of a given color at any specific point.

Typically, the pixels are stored in computer memory as a raster image or raster map, a two-dimensional array of small integers. These values are often transmitted or stored in a compressed form.



Raster images can be created by a variety of input devices and techniques, such as digital cameras, scanners, coordinate-measuring machines, seismographic profiling, airborne radar, and more.

They can also be synthesized from arbitrary non-image data, such as mathematical functions or three-dimensional geometric models; the latter being a major sub-area of computer graphics.





Color depth

Color depth or color depth, also known as bit depth, is the number of bits used to indicate the color of a single pixel, in a bitmapped image.



32 bit.png
16,777,216 colors
182 KB



8 bit.png
256 colors
38 KB (-80%)



4 bit.png
16 colors
19 KB (-90%)



2 bit.png
4 colors
17 KB (-91%)



1 bit.png
2 colors
6 KB (-97%)

Image File Formats

Image file formats are standardized means of organizing and storing digital images.

The size of raster image files is positively correlated with the resolution and images size (number of pixels) and the color depth (bits per pixel).

Image data can be compressed in various ways, however. A compression algorithm stores either an exact representation or an approximation of the original image in a smaller number of bytes that can be expanded back to its uncompressed form with a corresponding decompression algorithm.

Images with the same number of pixels and color depth can have very different compressed file size.

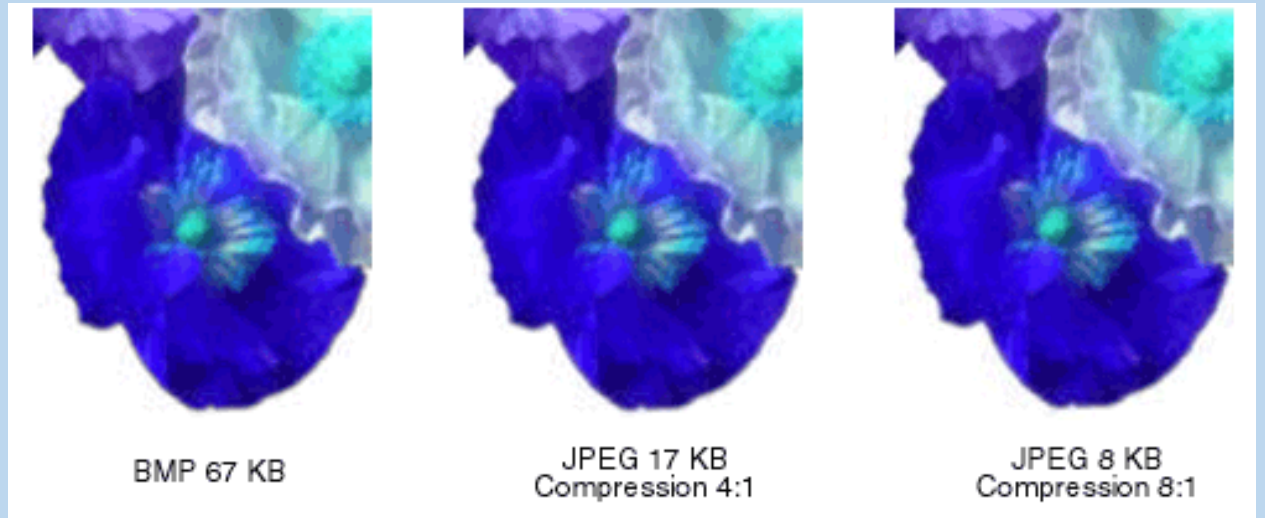


Image file compression

There are two types of image file compression algorithms: lossless and lossy.

Lossless compression algorithms reduce file size while preserving a perfect copy of the original uncompressed image. Lossless compression generally, but not always, results in larger files than lossy compression.

Lossy compression algorithms preserve a representation of the original uncompressed image that may appear to be a perfect copy, but it is not a perfect copy. Often lossy compression is able to achieve smaller file sizes than lossless compression. Most lossy compression algorithms allow for variable compression that trades image quality for file size.



BMP (Bitmap file)

The BMP file format, also known as bitmap image file, is a raster graphics image file format used to store bitmap digital images, independently of the display device (such as a graphics adapter), especially on Microsoft Windows and OS/2 operating systems.

It can be used in the Internet, but that is not common due to its usually large file size.

JPEG

JPEG (Joint Photographic Experts Group) is a lossy compression method .

The JPEG filename extension is JPG or JPEG. Nearly every digital camera can save images in the JPEG format.

JPEG applies lossy compression to images, which can result in a significant reduction of the file size.

Applications can determine the degree of compression to apply, and the amount of compression affects the visual quality of the result. When not too great, the compression does not noticeably affect or detract from the image's quality, but JPEG files suffer generational degradation when repeatedly edited and saved.

It is widely used in Internet.

GIF

GIF (Graphics Interchange Format) is in normal use limited to an 8-bit palette, or 256 colors . Supports also transparent color.

GIF is most suitable for storing graphics with few colors, such as simple diagrams, shapes, logos, and cartoon style images, as it uses LZW lossless compression, which is more effective when large areas have a single color, and less effective for photographic or dithered images.

Due to GIF's simplicity and age, it achieved almost universal software support.

Due to its animation capabilities, it is still widely used to provide image animation effects, despite its low compression ratio compared to modern video formats.

It is widely used in Internet.

PNG

The PNG (Portable Network Graphics) file format was created as a free, open-source alternative to GIF. The PNG file format supports transparent color.

Compared to JPEG, PNG excels when the image has large, uniformly colored areas. Even for photographs – where JPEG is often the choice for final distribution since its compression technique typically yields smaller file sizes – PNG is still well-suited to storing images during the editing process because of its lossless compression.

PNG is designed to work well in online viewing applications like web browsers.

TIF

Tagged Image File Format, abbreviated TIFF or TIF, is a computer file format for storing raster graphics images, popular among graphic artists, the publishing industry, and photographers. The TIFF format is widely supported by image-manipulation applications, by publishing and page layout applications, and by scanning, faxing, word processing, optical character recognition and other applications.

Although being possible to compress a TIF through a lossy process, most users tend to use it uncompressed or with a lossless compression.

The TIF file format supports transparent color. Due to its usually large file size this format is not usually used in the internet.

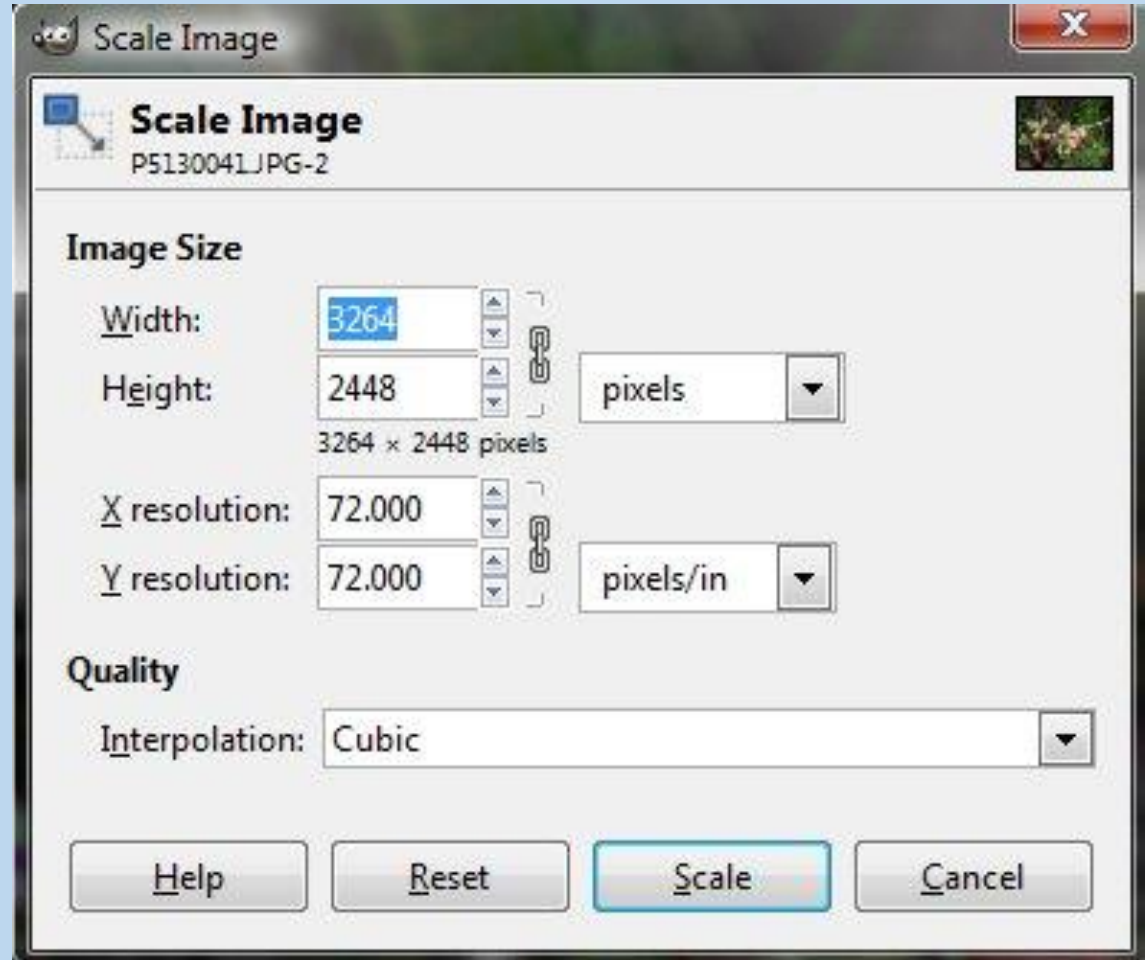
RAW

A camera raw image file contains minimally processed data from the image sensor of either a digital camera or a image scanner.

Raw files are named so because they are not yet processed and therefore are not ready to be printed or edited with a bitmap graphics editor.

Normally, the image is processed by a raw converter in a wide-gamut internal colorspace where precise adjustments can be made before conversion to a "positive" file format such as TIFF or JPEG for storage, printing, or further manipulation.

Size and Resolution



Color mode or Image mode

The color mode, or image mode, determines how the components of a color are combined, based on the number of color channels in the color model. Color modes include grayscale, RGB, and CMYK, among others.



1: RGB mode (millions of colors);

2: Index Color mode (256 colors);

3: Grayscale mode (2 colors).