History of Image Digital Formats Using in Information Technology

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ARTICLE INFO	ABSTRACT
	An important type of digital media is images, and in this article, we are going to review how images are represented and how they can be manipulated with simple mathematics. This is useful general knowledge for anyone who has a digital camera and a computer, but for many scientists, it is an essential tool. Printed publications use different formats to specify the properties of the information published; Thus, the uses that each type of each publication have been defined. Also, the formats of the digital images have been developed for use with a certain type of images and this article presents the benefits and uses of the different digital image formats.

1. Introduction

Today, we use digital information in much of our daily errands. Therefore, it has the use of digital images has increased, and other media text, sound and video, both in the commercial and personal sphere (Alyousuf, Din, & Qasim, 2020). This increase has been prompted by two factors that constantly interact in the progress of computer technology (Banik & Bandyopadhyay, 2015; Swain, 2014). The first of these is the continual increase in the ability of the hardware to process more information. The second is the tendency to use graphic and multimedia interfaces in the most common operating systems Windows and Macintosh, which they seek, on the one hand, to

facilitate and improve the user experience, in addition to doing much more attractive use of computers for the general public (Kh. & Hamarash, 2020). On the other hand, the multimedia use of these operating systems seeks to take better advantage of the continuous expansion in the capabilities of computers (Gunjal & Manthalkar, 2010; Jansirani, Rajesh, Balasubramanian, & Eswaran, 2011; Liao, Wen, & Zhang, 2011; Megalingam, Nair, Srikumar, Balasubramanian, & Sarma, 2010). The first personal computers only required text to be used. Operating systems like UNIX and Linux continue to use a command lines to execute the actions of the programs. The introduction of the graphical interface meant the need for machines capable of processing and presenting more complex information such as the photographic image and the sound. So currently a desktop personal computer text, image, audio and video smoothly (Gowsic, Manikandan, Sharma, Sivaram, & Porkodi, 2019).

During the last 25 years, two were the phenomena that directly affected the graphic advance of computing. On the one hand, the publishing world used computerized systems to streamline its production. Therefore, it was required to develop digital image formats and editorial design programs, as or more efficient than photomechanical processes (Chang & Tseng, 2004; Goel, 2008; Rafael C. Gonzalez 2008). In turn, the Internet turned out to be a frankly graphic medium and dynamic in the application of multimedia proposals (Ali & Yahiya, 2018). Nowadays, images and audio are used, but the use of animations and video is more and more common on electronic sites.

• Types of images

By the way of handling the data in an image file, there are two main ways to talk to manipulate the information that integrates a digital image (A. A. J. Altaay, Sahib, & Zamani, 2012; A. A. J. S. Altaay, Shahrin Bin Zamani, Mazdak, 2012; QASSIM & SUDHAKAR, 2015; Roshidi Din, 2018). These modes are map images Bit and vector images. Since each one is better adapted to a type of image, before to know the different formats, the operation of both vector images and of bitmap images.

▪ Bitmap Images

Bitmap images (bitmaps or raster images) are made up of a grid of cells. Each of these cells, which are called pixels, is assigned a value of its colour and luminance(QASSIM & SUDHAKAR, 2015). So, when we see the entire set of cells, we have the illusion of a continuous tone image.

Technique like that of the 19th century neo-impressionist painters. For example, the one used by Georges Seurat in his painting One Sunday afternoon at the Grande Jatte.
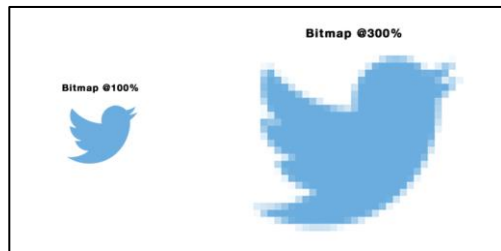

Figure.1: Bitmap Images

In Figure.1 can see, bitmap Images are created using individual pixels; the total number of pixels is determined by the physical size and resolution of the artwork, which is often abbreviated as dpi, or DPI Dots Per Inch). To give an example a 10cm x 10cm image at 72dpi will contain 80,089 pixels, whereas a 10cm x 10cm image at 300dpi will contain 1,390,041 pixels. The dpi of artwork will change depending on how it is to be used. Typically, computer monitors, laptops, tablets, and mobile devices all have a screen resolution of 72dpi, whereas traditional four colour and digital printing requires artwork to be supplied at 300 dpi .

Here is an enlargement of Seurat's work to reveal the pointillism technique that the painter used to paint a pixel is a unit of information, not a unit of measurement, since it does not correspond to a size concrete. A pixel can be tiny 0.1 mm. or very large1 cm.

1x
(10 x 10 px)
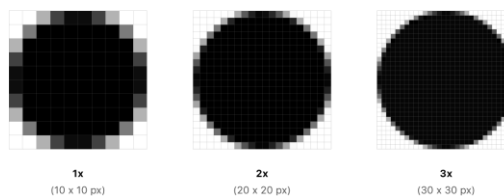
2x
(20 x 20 px)

3x
(30 x 30 px)

Figure.2: standard resolution (@1x) image that's 100px × 100px. The @2x version of this image would be 200px × 200px, and the @3x version would be 300px × 300px

In Figure.2 can see three-pixel grids at a different resolution, so they have different sizes When we create a bitmap image a specific pixel grid is generated. For this reason, to modify the size, we transform the distribution and coloration of the pixels, so that the objects within the image tend to deform.

This is because of objects loss or gain some of the pixels that define them. This feature will always be kept in mind that bitmap images are created with a certain size and lose quality if its dimensions are modified. It should be mentioned that these graphics are the most common in digital publications. Because it can be generated from digitized printed documents, it can be obtained through galleries both online as on CD-ROM, from a digital camera.

▪ **Vector Images**

Called also object-oriented graphics are vector images. Its size is much more reduced than bitmaps because the way they organize the information in an image is simpler than in those. This simplicity lies in generating the objects that make up an image through geometric lines determined by calculations and mathematical formulas. The vector graphics are displayed from the coordinates of a line saved as a reference, which forms the objects from the mathematical definition of the points and lines straight or curved.

While objects are defined Pixel by Pixel in a bitmap, they cannot be manipulated individually, otherwise, it happens with vector images, with them each object, within one image can be modified without altering the others. In a vector graph, they are delimited by the position of the starting and ending points and along the path of the line connecting them. As information saved mathematically, this makes vector images independent of the resolution of the monitor, since, unlike bitmaps, they do not depend on pixels. Therefore, they have the minimum or maximum resolution that the format in which they are stored allows. Likewise, increasing or decreasing the resolution of a vector graphic does not lose definition in the image. The computer only has to redefine the coordinates and vectors that the image contains resize objects. In a vector graphic, each vector has a contour line, with a certain colour and

thickness and, in turn, it also has a fill color. Therefore, the contour and fill characteristics are they can manipulate at any time. Vector images are stored as a list that mathematically describes the position of the points and the characteristics of their vectors, and instead of it. the properties of the objects. In Figure.3 can see an example of vector images.
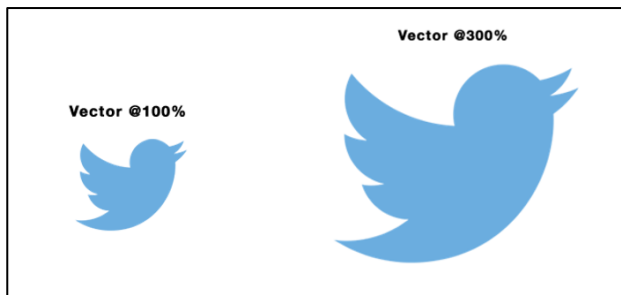

Figure.3: Vector Images

Finally, the constituent elements of the vector, in images of this type, are the Bezier curve. So, called because of Pierre Bezier who developed them on behalf of the Renault company, to simplify the design of their bodies. A Bezier curve is defined by four points: the start and endpoints of the curve nodes or anchor points and two control points handlers or handles, the latter, As its name implies, they serve to define the shape of the curve and will not appear in the final image. So, to modify the curve you only must move one of the nodes and define with the hand the degree of the curvature that the line will have. These curves are easy to handle and stylish and versatile since They adopt both very smooth (almost straight lines) and powerful (complex curves) curvatures. Also, they can adapt to the infinity. of forms. The design of icons and logos is one of the most frequent uses given to them, but they are also very useful in designing and manipulating text fonts.in Figure.3 can see Bezier curve
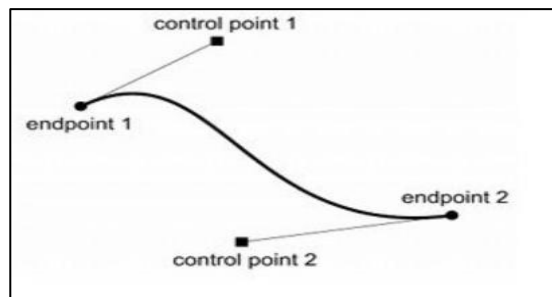
Figure.3 Bezier curve

- **Compression Types**

Different compression techniques have been developed because image files can occupy a lot of space, causing many times to be impossible to handle with common machines. These techniques try to reduce, through mathematical algorithms, the volume of the file to decrease the resources you consume and shorten the transfer time. These complex mathematical algorithms reduce in various ways the 0 and 1 that make up a digital image. Likewise, as with the formats of image, compression techniques are in the public domain or belong to the company that developed them. Its most common division is lossless compression and lossy compression; which is that So much image information is lost when compressed. Finally, it must be added that some of and write the formats can use several of the different compression techniques.

- **Lossless Compression**

This technique condenses the code strings without neglecting any of the information that forms the image, for what this one regenerates intact when being decompressed. However, the compression capacity is less that provides this type of techniques; since its purpose is to allow a quality impression, and an exact image display.

1. **Run Length Encoded (RLE)**

This compression scheme is the simplest and is based on replacing a certain sequence of bits with a code. This method analyses the image and determines the pixels that are the same color. When saving the image, simply register the color value and the position of each of the pixels that use it. With images that are composed of many or large areas of the same color, an excellent compression without losing quality. If the image contains many colours, the opposite happens, and at Compressing with this method, even files larger than the original can be obtained. It's used mainly with sweep image files.

2. **Lempel–Ziv–Welch (LZW)**

This method is very similar to the previous one but there are more, and the most common, formats that use it. Among these formats are tif, pdf and gif, although it is

also used by files that use the language PostScript. It is also very effective with images that contain large color areas. and simple images, but not with photographic images that contain a wide range of colors.

3. ZIP

This method is designed for all types of files and has a great extension in its use. For the same a vast majority of computers can read it. The file types that use it are pdf and tif.

- **Loss Compression**

Lossy compression causes the algorithms used, to reduce the code strings, to discard redundant image information. Thus, files compressed with this method lose part of the image data. Some formats, such as jpg, compensate for this loss with techniques that smooth edges and areas similar in colour, making missing information invisible naked eye. This method allows a high degree of image loss compression that many Sometimes, it is only visible if a strong zoom-zoom is made. The JPEG Group (Joint Photographic Experts Group) includes this compression method in jpg files and this is by far the format most widespread in design for the Internet. Also, other files such as pdfs and files based on the Postscript language (eps and ps), use this compression method.

- **Emerging compression systems**

These compression systems are designed to generate images with multiple resolutions from a single source file that is obviously limited by the actual resolution of the archived image. These systems provide great flexibility when manipulating images on the computer, but they are very close to professional and highly specialized circles.

- **Postscript Language**

A programming language designed by the founders of Adobe Systems, generate the description from any page that was easy to interpret by a professional printer. provides great accuracy when printing, this has been the native format used by the

design of the program for graphic arts and editorial areas. Same as, currently, largely only they use digital printing(Hanizan Shaker Hussain, 2018; Hussain, Wahab, Idris, Ho, & Jung, 2018; Poljicak, Botella, Garcia, Kedmenec, & Prieto-Matias, 2018; Roshidi Din, 2018). Since this system is a programming language, PostScript files are not properly designed files for the creation of images, but to integrate the different elements –text and image– that a page can have. Gustavo's article "The PostScript language" Sánchez Muñoz provides much more detailed information on the history, applications and PostScript language peculiarities (Awasthi, Sharma, & Husein, 2018).

- **Graphical File Types**

The formats are stated according to the ending the file would have. For example: **. Bmp or **. Png, where the asterisks before the period represent the name of the file and the letters after it the type of archive. Windows has been the most used operating system since its appearance and, has determined some of the most widely used digital image formats. The two formats that Paint supports Windows are BMP and PCX, although it should be noted that the use of the former has been much more noticeable. However, as in the computer world things are never forever, this circumstance in favour of the BMP format, previously cited, has been losing strength with the increased use of the Internet and the need for less robust formats. These new requirements for online publishing caused that small formats to be developed that maintain an acceptable quality when presented on screen. The most appropriate formats for these parameters have been rapidly spreading, overall because the use of browsers is more common every day, both for academic and commercial tasks as for general inquiries. It should be mentioned that the use of different operating systems has favoured that many of the image formats are normalized, that is, that if one creates a file in Windows it can be read by another operating system (A. A. J. Altaay et al., 2012; Neeta, Snehal, & Jacobs, 2006; A. J. Qasim, Din, & Alyousuf, 2020; Raja, Chowdary, Venugopal, & Patnaik, 2005; Sharda & Budhiraja, 2013).

1. PCX

This format was developed by Z soft to integrate it into its Paintbrush program. For the same use PCX is linked with the introduction of this program. Its diffusion has not

been very great. Even if it was one of the first digital image formats in the eighties, but today it is rarely to use it in projects of electronic publication or conservation of collections.

2. BMP

The BMP (Bit Map) format is the format of Windows bitmap images. Its use was very extended, but the files are huge iven the low compression they achieve (Alaa Jabbar Qasim, Din, Alyousuf, & Informatics, 2020).

Format	Colour Depth	Colour modes	Channels Alpha	Compression
BMP (.bmp)	1 bit: black and white	RGB	Not	Yes:
	4-8 bits: Grayscale	Indexed colour		RLE in 4 and 8 bits
	8 bits: colour Indexed	Grayscale		
	24 bit: RGB colour	Bitmap		

3. PSD

This is the Adobe Photoshop format and, therefore, it is the only one that supports all the functions that this program contains. However, its use focuses on image manipulation and not so much for be employed in digital publications(A. A. J. Altaay et al., 2012; Neeta et al., 2006; Raja et al., 2005; Sharda & Budhiraja, 2013). It has great advantages for editing, since when saving with in this format we can keep the layers (in these we can manipulate the different elements of an image separately) that we have used in image manipulation (Al-Alkawi, Hanfesh, & Rauof, 2019).

4. EPS

This format called Encapsulated PostScript is practically supported by all editing and image processing programs. Can integrate both vector graphics like bitmap. To be able to print this type of files you must use a printer PostScript. It has two advanced versions: the DCS with which we can save colour separations in 32-bit CMYK images and DCS 2.0 that allows you to export images that contain ink channels flat.

5. TIF

The TIF (Tag Image File Format) format is used for bitmap images and is practically supported for all desktop publishing and image processing applications. This format

was developed by Aldus Corporation. It is recognized by almost all programs. In addition, it is compatible with PC and Mac. It is one of the most widespread in the graphics industry due to the image and printing quality it presents.

Format	Depth of Color	Color modes	Alpha Channels	Compression
TIF (.tif)	32 bits	Bitmap	Yes	Yes (LZW)
		Indexed color		
		Grayscale		
		RGB		

6. GIF

The GIF format corresponds to the abbreviation of Graphics Interchange Format, property of CompuServe. The GIF format is preferable for non-continuous tone images or large areas of the same colour since it uses an indexed colour palette that can have a maximum of 256 colours (Miran & Kadir, 2019). One of its greatest advantages is that we can choose one or more colours from the palette to make them transparent and we can see the elements that are below these. It is also one of the few image formats we can show animations because it makes different Frames run sequentially. In addition, it is a compression format designed to decrease the data transfer time over the telephone lines(Din, Mahmuddin, Qasim, & Technology, 2019).

Format	Depth of Color	Colour modes	Alpha Channels	Compression
GIF (.gif)	8 bits (256 colours)	Bitmap	Not	Yes: (LZW)
		Indexed Colour		
		RGB		

7. JPG or JPEG

This format takes its name from the Joint Photographic Experts Group, an association that developed it. Used usually to store photographs and other continuous-tone images. Because it uses a system Compression that efficiently reduces file size. In contrast to GIF, JPEG saves all the information regarding colour with millions of colours (RGB) without obtaining files excessively big. In addition, current browsers recognize and faithfully display this format.

Format	Depth of Colour	Colour modes	Alpha Channels	Compression

Jpeg (.jpg; .jpe)	24 bits	Grayscale	Not	Yes: with losses
		RGB		
		CMYK		

8. PNG

PNG is the acronym of the group that developed its Portable Networks Graphics thinking about an ideal format for distribution on the Internet. PNG has advantages over the other more common formats in this medium: JPG and GIF. Since it was specially developed for network distribution, it has a large part of the advantages of a GIF and a JPG (Al-Yousuf, Din, & Science, 2020). For example, it allows high levels of understanding, in addition, it will enable the use of the indexing technique to create transparent colours, semi transparencies, or degraded transparencies. Finally, you are not limited to a 256 colour palette, but you can use millions of colours. Its only limitation is that we cannot create animated files.

Format	Depth of Colour	Colour modes	Alpha Channels	Compression
PNG (.png)	24 bits	RGB	Yes	Yes without losses
		Indexed Colour		
		Grayscale		
		Bitmap		

9. PDF

The PDF format is not properly a file used in the design of images. But it has been one of the solutions to publish, on the Internet, not very robust documents that integrate both images and text. Also, it assures the author that the document will always be viewed as he designed it. It is necessary for viewing to have the Adobe Acrobat Reader program(Alaa Jabbar Qasim et al., 2020), which can be used by different operating systems(Din, Qasim, & Informatics, 2019). This format is based on the Postscript language, allowing you to include both vector graphics and bitmaps. The use of PDF has taken great strength among digital publications, in addition to maintaining the page format and including Different types of graphics, links can be made within the same file and to online pages. The PICT format is the most widely used on the Macintosh platform. It is used as a file format for file transfers between applications.

PICT is especially effective in compressing They contain large areas of solid colour. The compression made by the PICT format is not good for alpha channels that normally contain large black and white surfaces.

10. Progressive JPG

ProJPG files are JPEGs that are designed for online use, so they are viewed by stages in browsers. The image is displayed throughout and, while loading, its definition improves. In this we do not have to wait for the full image load to see its content. However, there are still few browsers that recognize this format, affecting its use.

Conclusion

So, there you have it, I hope you found this helpful articleand the information above helps you understand the advantages and disadvantages of both vector and bitmap files when creating your artwork.

	Advantages	**disadvantages**
Vector files	Vector files can be resized almost indefinitely; therefore, they are the ideal choice for creating graphics that will be used across multiple applications at differing sizes, a company logo for example	Very complex vector files contain large amounts of information, which can cause your computer to slow down considerably or even crash.
	Vector files can be converted to bitmapped images quickly and easily.	Vector artwork can take a lot of skill, time and therefore cost to create, making it unsuitable for smaller budgets or time critical projects
Bitmap files	Compared to vectors bitmap files are a lot easier, quicker and therefore cheaper to create. If you have a digital camera or a desktop scanner you can create bitmap artwork in a matter of minutes	The biggest disadvantage of bitmaps is their lack of upward scalability. Once bitmap artwork is enlarged beyond its original size there is a huge loss in image quality
	Bitmap artwork can be saved in a wide range of file formats including TIFFs, JPEGs, GIFs and PNGs, making them suitable for printed, electronic and online media.	Bitmap files are very storage hungry compared to vectors, especially when saved for print. An A3 vector file could be less than 1MB in size, whereas the same artwork saved as a bitmap could be upwards of 50MB

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پـوخـتـه:

بلاوکراوه چاپکراوهکان بناغهی نهخشهسازی جیاواز بهکاردینی بو دیاریکردنی تایبهتمه ندیهکانی زانیاره بلاوکراوهکان. بو ئهوه بهکارهینانهکانی ههربلاوکراوه پێناسهکراوه. ههروهتر بناغهی نهخشهسازیهکانی بوچونی ژمارهیی پێشکهوتو کراوه بو بهکارهینانی لهگهڵ جوریك له بوچونهکان وئهم تویژینهوه چهندجوره سوودمهندی و بهکارهینانیکی بناغهی بوچونی ژمارهیی داناوه

تاريخ امتدادات الصور الرقمية المستخدمة في تكنولوجيا المعلومات

الملخص:

تستخدم البحوث تنسيقات مختلفة لتحديد خصائص المعلومات المنشورة ؛ وبالتالي ، تم تحديد الاستخدامات التي يستخدمها كل نوع من كل منشور. أيضًا ، تم تطوير تنسيقات الصور الرقمية لاستخدامها مع نوع معين من الصور ، وتعرض هذه المقالة فوائد واستخدامات تنسيقات الصور الرقمية المختلفة.