**Graphic and Image**

A **graphic** or graphic image is a digital representation of information other than text. B. Drawings, figures, or photographs. Many websites apply colorful graphic designs and images to convey their message. Two of the more common graphic formats that exist on the web are JPEG and GIF.

Computer graphics are either 2D or 3D. Early computers only supported monochrome 2D graphics. It was black and white (or black and white on some monitors). Eventually, computers began to support color images. Initial machines only supported 16 or 256 colors, but most computers today can display millions of colors of graphics. https://techterms.com/definition/graphics#:~:text=A%20graphic%20is%20an%20image,and%20letters%2C%20rather%20than%20images.

**Image**

An image, also known as a still image, is a digital image that is a binary representation of all types of visual information, such as drawings, individual video frames, logos, images, and graphics

<https://anydifferencebetween.com/difference-between-graphics-and-images/>

An image is made up of a rectangular array of dots called pixels. Image dimensions are specified in width X height, in pixels. The physical size of the image, in centimeters or inches, it totally depends on the resolution of the screen on which the image is displayed. Resolution is often measured in Dots Per Inch (DPI). An image will be smaller on a higher resolution device than on a lower resolution device. For color images, to represent all colors of an image there should be enough bits per pixel. The number of bits per pixel is called the image depth. [**https://www.tutorialspoint.com/multimedia/multimedia\_images\_graphics.htm**](https://www.tutorialspoint.com/multimedia/multimedia_images_graphics.htm)

**Codec** is a technology for compression files, consists of two components encoder **–** to compress files and decoder to decompress.

There are different types of image codecs available, based on different algorithm of compression with a different specifications, platform etc.

**BMP.** Shrink image by throwing away pixels, which might lead to the change of an image in an unacceptable manner. Bitmap files are limited to RGB-images but provide very good photo quality. It’s not supported enough across multiple platforms.

**GIF**. Compresses by scanning horizontally across a row of pixels and finding solid areas of color with no loss of information for an image. Best choice for distributing color image on web. Allows to create animated graphics.

**JPEG.** Very low level of complexity, memory efficient, allows to reduce the file size. Provide a good quality picture. But codec has no lossless capability, provides only single quality and single resolution.

**MJPEG.** It is a lossy codec, often used as a storage format. Degradation of an image is minimal if image had 100% quality. Might be hard to work with a large image.

**TIFF.** An uncompressed TIFF codec retains the best quality of a photographic image, making it ideal for digital masters.

It’s also lossless, can be compressed or decompressed. But unfortunately produce large file size.

**PNG**. Lossless compression with no color information loss, is recognized and supported on all platforms. But does not support animation and has a low quality

[**https://imagecodecs.wordpress.com/**](https://imagecodecs.wordpress.com/)

**Image data types**

To create an image a variety of techniques could be used for representing data - called data types, such as monochrome and color images. Monochrome images are created in a single color, and color images are created in multiple colors. Some data types of images are:

**1-bit images**. An image is a set of pixels. In 1-bit images, each pixel is stored as a single bit (0 or 1). A bit has only two states either on or off, white, or black, true or false. Also known as a binary image.

A 1-bit image with resolution 640\*480 needs a storage space of 640\*480 bits or 37.5KB.

The quality or clarity of 1-bit image is extremely low.

**8-bit Gray level images**.Each pixel of 8-bit gray level image is by a one byte, each pixel can hold 2 in power of 8 = 256 values between 0 and 255. Every pixel shown as a brightness on a scale from 0 to 255,it means all pictures composed of gray shades only – monochromatic.

A 8-bit image with resolution 640 x 480 needs a storage space of 300KB.

**24-bit color images** - each pixel equal to 3 bytes often representing R-G-B (Red, Green and Blue). Each true color represented by 256 shades of RGB – it means there are 16777216 color variations.

Often 24-bit color images are stored with an extra byte to store an alpha value for special effect information (32 bits in total).

Main disadvantages of this type that images require large storage space.

[**https://www.tutorialspoint.com/multimedia/multimedia\_images\_graphics.htm**](https://www.tutorialspoint.com/multimedia/multimedia_images_graphics.htm)

**Image file formats**

Applying the right image formats can help to get the best performance for a particular need. For example, by using a correct format speed of loading a webpage can be increased, it is especially important with a low internet traffic.

The are 13 the most popular image formats that are widely used.

**JPEG** – very good for web images, printing, saving files to camera, picture sharing, great for projects on the web. But better not used it for text-focused images.

**PNG** – great for web images, text-focused images, logos, and high-resolution pictures. Can be edited with no loss for quality, saves an image with more colors on a transparent background when used on web. Not good for printing.

**BMP** –generally outdated format. It’s supported by all biggest browsers and image viewers.

**GIF** – perfect for simple animations. Very good for demonstrating tutorial steps. However, not suitable for images with rich colors.

**TIFF/TIF** – good for printing and scanning documents. Not suitable for web pages, takes forever to load. Because of lossless compression original image data is maintained regardless of how often you might copy, re-save, or compress the original file.

**HEIF** – it’s used for saving high-quality images on newer devices, providing better-optimized file sizes. It is not the best choice for accessing images on browsers and OS.

**RAW** – it is least-processed image type, recommended for high-quality photographs. RAW images are very important because they capture every element of a photo without processing and losing small visual details. Not suitable for web usage.

**PSD** – it is special Adobe Photoshop’s format used for graphic design projects that can be edited. This type of file contains "layers" that make modifying the image much easier to handle. Not suitable for printing or web usage.

**SVG** – great for web images, images with simple shapes, 2D illustrations, and importing 2D images to 3D modeling software. Not suitable for displaying detailed images with high color depth, such as photographs.

**EPS** – file in vector format, should be used for printing, illustrations, graphic design. Bad for photographs.

**PDF** – great for printing, visual reports, infographics. Not suitable if some changes are required to the image.

**INDD** – used in Adobe InDesign for saving editable layouts or page designs. Not suitable for web usage.

**AI** – mainly used for saving vector graphics in Adobe Illustrator. Most reliable type of file format for using images in all types of projects from web to print.

[**https://www.hostinger.com/tutorials/best-image-formats**](https://www.hostinger.com/tutorials/best-image-formats)

**Raster Image Files and Vector Image Files**

Raster images are constructed by a series of pixels, or individual blocks, to form an image. Every photo a raster image. Pixels have a defined proportion based on their resolution (high or low), and when the pixels are stretched to fill space, they were not originally supposed to fit, they become distorted, resulting in blurry or unclear images.

[**Top 8 Raster Formats**](https://www.hostinger.com/tutorials/best-image-formats#Top_8_Raster_Formats)

[1. JPEG and JPG](https://www.hostinger.com/tutorials/best-image-formats#1_JPEG_and_JPG)

[2. PNG](https://www.hostinger.com/tutorials/best-image-formats#2_PNG)

[3. BMP](https://www.hostinger.com/tutorials/best-image-formats#3_BMP)

[4. GIF](https://www.hostinger.com/tutorials/best-image-formats#4_GIF)

[5. TIFF](https://www.hostinger.com/tutorials/best-image-formats#5_TIFF)

[6. HEIF](https://www.hostinger.com/tutorials/best-image-formats#6_HEIF)

[7. RAW](https://www.hostinger.com/tutorials/best-image-formats#7_RAW)

[8. PSD](https://www.hostinger.com/tutorials/best-image-formats#8_PSD)

**Vector Image Files**

Vector images are way more flexible. They are constructed using proportional formulas rather than pixels. **EPS**, **AI** and **PDF** are perfect for creating graphics that require frequent resizing. Provide ability for images to be sized as tiny as a postage stamp, or huge enough to fit on an 18-wheeler.

[Top 5 Vector Formats](https://www.hostinger.com/tutorials/best-image-formats#Top_5_Vector_Formats)

[1. SVG](https://www.hostinger.com/tutorials/best-image-formats#1_SVG)

[2. EPS](https://www.hostinger.com/tutorials/best-image-formats#2_EPS)

[3. PDF](https://www.hostinger.com/tutorials/best-image-formats#3_PDF)

[4. INDD](https://www.hostinger.com/tutorials/best-image-formats#4_INDD)

[5. AI](https://www.hostinger.com/tutorials/best-image-formats#5_AI)

https://blog.hubspot.com/insiders/different-types-of-image-files

**Different Types of Media**

We use various media to get news, learn new things and have fun. With the development of technology, we can choose the type of media we want to use.

The goal of media is to convey an advertising message to the audience through the most appropriate media channel for their product.

In general, media can be classified in three main

**Print media.** Previously, this type of media was the only way to convey information to the population. In the 80s and 90s print media was the only means of entertainment. People trusted and on magazines, newspapers – good source of vital information about a country or the world. Includes newspaper, magazines, books, banners, billboards, brochures, flyers etc.

**Web media (internet media).** The most popular type of media at the moment, moreover some young generations are using only that type of media. This media includes social networks or websites, online forums, podcasts

**Online forums -** an online place where we can comment, message, or discuss a particular topic. Forums allow us to share knowledge with other people with the same interest. That’s why it’s regarded as the best platform to seek support and assistance.

[**https://whatagraph.com/blog/articles/different-types-of-media**](https://whatagraph.com/blog/articles/different-types-of-media)

## Pixelate

Most image files, such as JPG, PNG, and GIF, are bitmaps or they're maps of bits - essentially grids of pixels that blend smoothly  together to form an images. Pixels are the smallest squares of hue, saturation, and lightness (HSL) that make up the grid of a digital image. Pixelation occurs when, instead of perfectly blending, pixels are visible to the naked eye. Image can be accidentally pixelate when change a scale of an image to a size too large for its resolution. https://www.adobe.com/nz/creativecloud/photography/discover/pixelate-image.html

**Free sources** of images for games can be found on the internet, some examples of those website are below:

<https://www.freepik.com/free-photos-vectors/2d-game>

<https://craftpix.net/freebies/>

<https://www.shutterstock.com/ru/search/2d+game+art>

There is a very good tool that can be used for pixaleting any images - pixel it

<https://giventofly.github.io/pixelit/>

**Unity**

Unity imports image files as textures. Unity supports most common image file types, such as BMP, TIF, TGA, JPG, and PSD. If you save your layered Photoshop (.psd) files in your Assets folder, Unity imports them as flattened images. ( <https://docs.unity3d.com/Manual/AssetTypes.html#:~:text=Unity%20supports%20the%20FBX%20file,natively%20supports%20importing%20SketchUp%20files>.)

Analysis of the most common image extension is below. Compressing and converting of the image was applied by using a GIMP. Image was taken from a free source. As a source for converting and compressing was taken the same original image every time.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Image extension | Image  compression | Dimensions | Image size | Review of an user |
| GIF | No compression applied | 3000\*2132 | 1832kb | Bad, blurry |
| TIFF | Not applicable | 3000\*2132 | 1875kb | Good |
| BMP | 16bit | 3000\*2132 | 12493kb | Bad quality |
| BMP | 24bit | 3000\*2132 | 18739kb | Ok |
| JPG | Low | 3000\*2132 | 3175kb | Perfect |
| JPG | Medium | 3000\*2132 | 550kb | Acceptable if no zooming is applied |
| JPG | High | 3000\*2132 | 118kb | Terrible, blurry |
| JPG | Original as downloaded | 3000\*2132 | 930kb | Good |
| PNG | Low | 3000\*2132 | 18785kb | Perfect |
| PNG | High | 3000\*2132 | 5559kb | Almost Perfect |

After the analysis, the highest rating was shown by the formats PNG and JPG. Even with no compression applied, JPG-format provided extremely good quality despite small image size – only 3 MB. Despite after full zooming in 460% applied image is still showing good quality. PNG extension on the other hand have an extremely large size of an image – 18 MB, but after compression down to 5.5MB quality is almost the same as before.

Lowest rating received JPG format after maximum compression down to 118KB, unfortunately this image is awful at this size.

Gif format is also terrible choice for an image, because with a size of 1832KB quality as terrible as JPG with 118KB size.