

Digital Image File Types Explained

JPG, GIF, PNG, BMP, AVI. What are they, and how do you choose? These and many other file types are used to encode digital images. The choices are simpler than you might think.

Part of the reason for the amount of file types is the need for compression. Image files can be quite large, and larger file types mean more disk usage and slower downloads. Compression is a term used to describe ways of cutting the size of the file. Compression schemes can be lossy or lossless.

Another reason for the many file types is that images differ in the number of colours they contain. If an image has few colours, a file type can be designed to exploit this as a way of reducing file size.



Lossy vs. Lossless Compression

You will often hear the terms "lossy" and "lossless" compression. A "lossless" compression discards no information. It looks for more efficient ways to represent an image, while making no compromises in accuracy. In contrast, "lossy" accepts some loss of quality in the image in order to achieve smaller file size.

Number Of Colours

Images start with differing numbers of colours in them. The simplest images may contain only two colours, such as black and white, and will need only 1 bit to represent each pixel. Many early PC video cards would support only 16 fixed colours. Later cards would display 256 simultaneously, any of which could be chosen from a pool of 224, or 16 million colours. New cards devote 24 bits to each pixel, and are therefore capable of displaying 224, or 16 million colours without restriction. A few display even more. Since the eye has trouble distinguishing between similar colours, 24 bit or 16 million colours is often called TrueColour.



Have you ever wondered when you should use a JPG instead of a PNG? Or perhaps you are just trying to work out what programme opens a WMV.

Unless you are a graphic designer you've never needed to understand things like what separates a PNG from a PDF from a JPG. Whilst the large variety of image formats may seem overwhelming there is a method in the madness.

The following information should help you to understand the difference between each file format and when to use them.



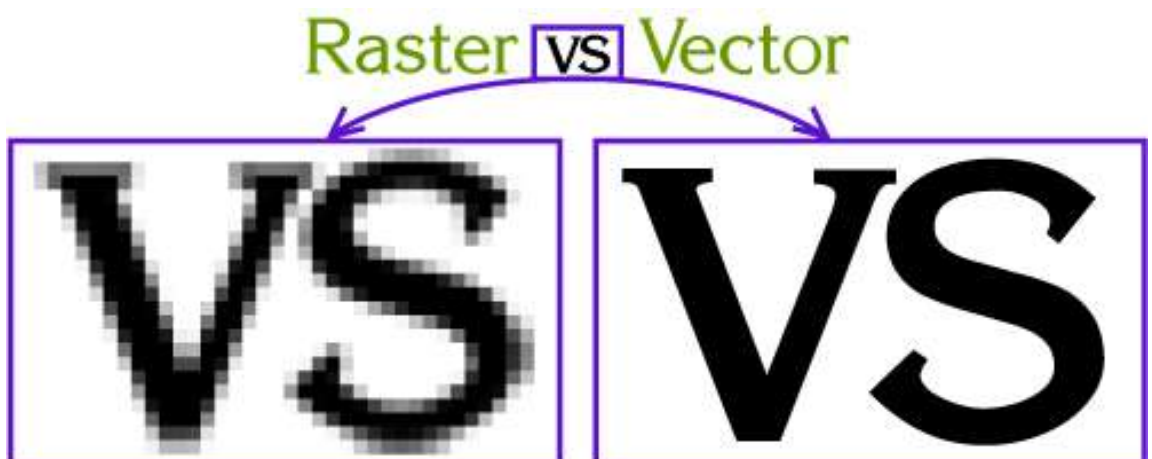
Vector vs. Bitmap (Raster)



First things first, what is the difference between vector and raster?

Raster images are constructed by a series of pixels, or individual blocks, to form an image. JPEGs, GIFs and PNGs are all raster images. Every photo you find online or in print is 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 intended to fit, they distort resulting in blurry or unclear images. In order to retain pixel quality, you cannot resize raster images without compromising their resolution. As a result, it is important to remember to save raster files at the exact dimensions needed for the application.

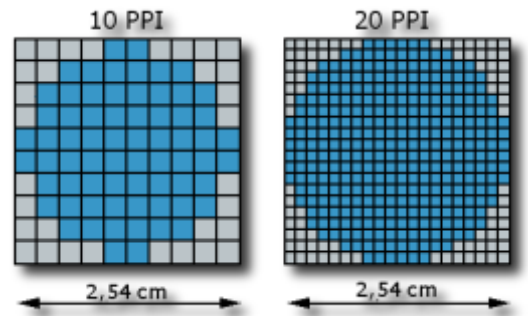
Vector images are far more flexible. They are constructed using proportional formulas rather than pixels. EPS, AI and PDF are perfect for creating graphics that require frequent resizing. Your logo and brand graphics should have been created as a vector, and you should always have a master file on hand. The real beauty of vectors lies in their ability to be sized as small as a postage stamp, or large enough to fit on a large billboard or the side of a large lorry!



High Resolution vs. Low Resolution

Have you heard a designer talk about DPI or PPI? DPI stands for “dots per inch” and PPI translates to “pixels per inch.” These units of measure are essential for determining if the density of pixels in an image is appropriate for the application you are using.

The biggest thing to note when determining what DPI or PPI you require is if you are using an image for print or web. Websites display images at 72 dpi, which is low resolution; however images at this resolution look really crisp on the web. This is not the case for print. Best practices for printing an image will require it to be no less than 300 dpi.



Don't try to trick the system. A lot of magic can happen in Photoshop, but creating pixels out of thin air isn't one of them. Pulling an image off of the web and trying to get it to fit the dimensions of your print project

just won't work. You will end up with a pixelated image that appears stretched and distorted. Now we're familiar with the different terms people use for images, let's talk about different file formats.

FILE TYPES

The file types you will need to know can be split into four main groups:

Images– Raster

JPG Joint Photographic Experts Group

BMP Bitmap

PNG Ping

Images– Vector

AI Adobe Illustrator Artwork

EPS Encapsulated Postscript

Video Files

WMV Windows Media Video

AVI Audio Video Interleaved

3GP Third Generation Partnership

MOV Quicktime Movie

MPEG Moving Picture Experts Group

Document Display File

PDF Portable Document Format

Raster File Formats

There is an extremely large number of different raster formats. These are images that are made up from a series of pixels, or individual blocks, to form the image. Some of the most common types include: JPEG, PNG and BMP.

Broadly speaking, they fall into two categories:

Lossy image formats (e.g., JPEG) have smaller file sizes but do not store a perfect copy of the image. They are best suited to photographs and other images where perfect accuracy is not important. They are also commonly used on the web to save bandwidth.

Lossless image formats (e.g., PNG, and BMP) store an exact pixel-by-pixel representation of the image, but require more space. They are more suitable for things like logos. Arguably the best of these formats is PNG, which is recommended bitmap format for logos. It is widely supported and has very good compression.



File formats

JPEG/JPG

One of the most widely-used image formats is the JPEG format (Joint Photographers' Expert Group). This format uses lossy compression—this means that a certain amount of the image quality is lost during saving. It also allows the user to specify what level of compression they desire, trading off the true image for file size.

It is not recommended using JPEG files for rasterized vector art, as the compression artifacts substantially degrade the quality of the image near edges.



BMP

There are actually several BMP formats (BitMaP). Windows and Macintosh have their own formats, both of which are called BMP. Most modern image editing tools are able to read both.

In any case, all of the variants of BMP should be avoided when possible, as they use little to no compression and consequently have unnecessarily large file sizes.



PNG

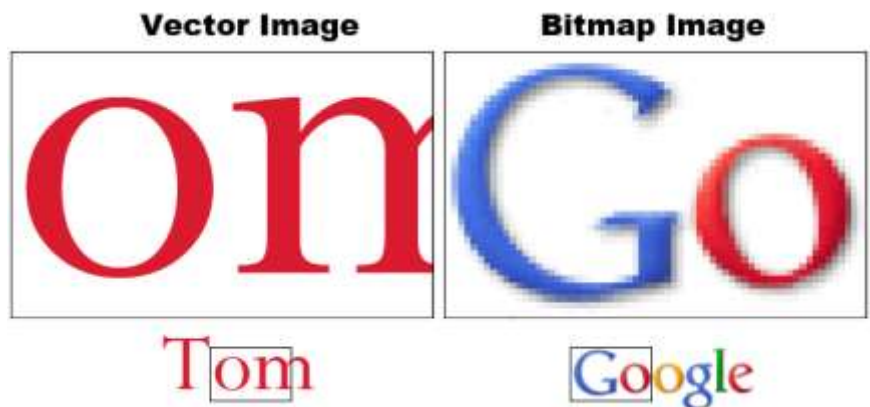
The best of the lossless image formats is called PNG (Portable Network Graphics). This format is widely supported by web browsers and image viewers/editors.

PNG also saves colour transparency when saving.



Vector File Formats

Vector graphics are made up of paths, rather than individual pixels. These paths can be used to represent lines and shapes within the image. Most vector image formats can also include colours, gradients, and image effects. Since vector graphics store image data as paths, they can be enlarged without losing quality, which makes them a good choice for logos and other types of drawings.



Common vector image file extensions include AI and EPS.

AI

Drawings created with Adobe Photoshop and Adobe Illustrator, a vector graphics editing program; composed of paths connected by points, rather than bitmap image data; commonly used for logos and print media.

Since Illustrator image files are saved in a vector format, they can be enlarged without losing any image quality. Some third-party programs can open AI files, but they may rasterize the image, meaning the vector data will be converted to a bitmap format.



EPS

This used to be the most common file format when preparing artwork for print. It may contain 2D vector graphics, bitmap images, and text and it can also include an embedded preview image in bitmap format and can also be placed within another PostScript document.

EPS files are supported by several different drawing programs and vector graphic editing applications. They are often used as a standard means for transferring image data between different operating systems.



PDF Files

Adobe's PDF format (Portable Document Format) is very widely used as a general purpose platform-independent document format.



A PDF file captures document text, fonts, images, and even formatting of documents from a variety of applications. You can e-mail a PDF document to your friend and it will look the same way on their screen as it looks on yours, even if they have a Mac and you have a PC. Since PDFs contain colour-accurate information, they should also print the same way they look on your screen.

To view a PDF file, you need Adobe Reader, a free application program distributed by Adobe Systems. Adobe also makes an Acrobat Plug-in for Web browsers that enables PDF files to be viewed inside a browser window.

Video File Formats



A video file format is a type of file format for storing digital video data on a computer system. Video is almost always stored in compressed form to reduce the file size

The Video Files category includes a wide range of video formats, which use different codecs to encode and compress video data. This category also includes video project files and video information files, which may not contain video data.



Common video file extensions include .MPG, .MOV, .WMV, .AVI and .3GP.

MPEG

Common digital video format standardized by the Moving Picture Experts Group (MPEG); typically incorporates MPEG-1 or MPEG-2 audio and video compression; often used for creating movies that are distributed on the Internet.



MOV



Common multimedia container file format developed by Apple and compatible with both Macintosh and Windows platforms; may contain multiple tracks that store different types of media data; often used for saving movies and other video files; commonly uses the MPEG-4 codec for compression.

WMV

Video file based on the Microsoft Advanced Systems Format (ASF) container format and compressed with Windows Media compression; similar to an .ASF file and contains video encoded with one of Microsoft's Windows Media Video (WMV) proprietary codecs



AVI



Video container or wrapper format created by Microsoft; stores video data that may be encoded in a variety of codecs; typically uses less compression than similar formats such as .MPEG and .MOV.

3GP

Audio and video container format developed by the 3rd Generation Partnership Project (3GPP); designed as a multimedia format for transmitting audio and video files between 3G cell phones and over the Internet; commonly used by mobile phones that support video capture.



File Types Summary

This page gives a summary of the common file types that you will need a knowledge of for the advanced higher exam along with their advantages and disadvantages:

Images- Raster

FILE	FULL FILE NAME	ADVANTAGES AND DISADVANTAGES	COMMON USES
JPG	Joint Photographic Experts Group (raster)	Lossy Can be highly compressed 24 bit colour Small file size	Digital camera images Web graphics E-mail attachments Inserting images into MS word
BMP	Bitmap (raster)	Lossless Large file size 24 bit colour	High quality graphics Slow download for internet
PNG	Portable Network Graphics (raster)	Low data file allows quick downloads True colour– 48 bit Supports transparency	Websites Web animation Saving images with transparency

Images-Vector

FILE	FULL FILE NAME	ADVANTAGES AND DISADVANTAGES	COMMON USES
AI	Adobe Illustrator (vector)	No loss of quality when enlarged Hard edges Small file size	Logo's Business Cards Sign Making
EPS	Encapsulated Postscript (vector)	No loss of quality when enlarged Non lossy hard edges Small print sizes keep clarity	Logos Good format for printing Business Cards

Video Files

FILE	FULL FILE NAME	ADVANTAGES AND DISADVANTAGES	COMMON USES
WMV	Windows Media Video	Good compression and quality Widely compatible with windows PC Not widely compatible with Mac	Movie playback on Windows PC
AVI	Audio Video Interleave	Very high quality audio Files can be compressed	Video, audio playing on a PC Web videos for short movies, advertisements and promos
3GP	Third Generation Partnership	Fast internet phone connections 3G internet drains battery quickly 3G services are more expensive	Webpages on 3G Mobile phones Video calls Audio files for PS3, Nintendo DS
MOV	Quicktime Movie	Small file size Can enhance sound and picture quality Can play on Mac and windows PC	Plays move files and video clips
MPEG	Moving Pictures Expert Group	Low file sizes Relatively high quality Multiple hours of filming on one disc	DVD, CD-ROM movies and videos Internet streaming of films, videos Audio only digital files

Document Display Files

FILE	FULL FILE NAME	ADVANTAGES AND DISADVANTAGES	COMMON USES
PDF	Portable Document Format	Highly compressed files Not easily edited Format opened by most computers	Saving documents Final 'proofs' to send to printers E-mail