

UNDERSTANDING IMAGES

PART 1

GUIDE TO FILE FORMATS

You have probably wondered every time you work on a picture in an image editing software program and go to “Save As” why you have so many choices and which one to select. Have you ever thought “Does it really makes a difference if I save it as a JPEG, a TIFF, in the image software format or any other format as long as I can print it or put it onto the web?” The answer is yes and here are some of the options to consider when saving to a particular file type.

CONSIDERATIONS WHEN SELECTING A FILE TYPE

COMPRESSION

Since image files can be quite large especially with the high resolution cameras on the market today many formats use some kind of compression a method of making the file smaller by removing or changing information. You can choose a format that uses “lossless compression,” i.e. no information is removed from the image which results in a file that appears identical to the original only smaller. You can also use a format with “lossy compression” where you permanently remove information from the image but in a way that is not obvious to most people. However doing this repeatedly results in a degraded image so there is a trade off between small file sizes and image quality to take into consideration.

COLOR DEPTH

Color depth is more related to computer monitors than anything else. Color depth refers to the amount of colors found in an image and is expressed in bits, the smallest unit of binary measurement. An image’s color depth can range from one bit (black and white) to 24 bits, which provides more than 16 million different colors, called “true color” this is approximately the most that the human eye can see. Initially computer monitors were only able to show limited colors but with the advent of video cards monitors now can almost always show 24 bit “true color.” However the more colors an image contains the bigger the file.

COMMON IMAGE FORMATS and USES

BMP

Bitmap (BMP) files are the default image format used by Microsoft operating systems and by Windows Paint. Like GIFs, JPEGs, PNGs and TIFFs (see later for information) BMPs are raster based meaning they use thousands or millions of pixels to compose an image. As an aside vector based are images made from geometric shapes and unlike

raster images (based on pixels) can be enlarge from the size of a matchbook to a billboard without loosing clarity and crispness.

Typically BMPs do not use compression and files are usually large and can range in resolution from 1 bit (black and white) to 24 bit (16+ million colors).

USES

BMPs are generally not used in image manipulation although you may find some pictures you download from the web are in this format.

EPS

Encapsulated Post Scripts (EPS) industry standard formats used in professional printing. The full version of Adobe PhotoShop and Adobe Illustrator both can save files as ESPs.

USES

This is a vector based graphic and is popular with printers and others who create logos or jobs that do not contain photographs.

GIF

Graphics Interchange Format (GIF) are unlike other popular image formats in that they only support up to 8 bits of color (or 256 colors). Originally developed by CompuServe it still lingers on despite the introduction of the PNG format (see below.)

USES

Commonly used on web pages as navigation buttons or small animated figures.

JPEG or JPG

Joint Photographic Experts Group (JPEG or sometimes shortened to JPG) use “lossy compression.” Most users will not see a difference between a JPEG image and the original an image. However an image that has been heavily compressed (several times open and close as JPEG) will show some blurriness and pixilation.

USES

AS the inclusion of the word “photographic” in the name suggests it is most used for photographs particularly for the web and e-mail. Because the format uses 24 bit color it can faithfully reproduce a photograph and at the same time its compression algorithm gives a reasonable size of file.

PNG

Portable Network Graphic developed to replace the GIF format employs lossless compression and can be saved in 24 bit mode giving a wider range of colors plus it has a variable transparency feature which allows individual pixels to have different degrees of transparency adding to the color range.

USES

It was developed in 1995 as a replacement for the GIF but because (I think) it was developed by an independent group and not by a major player such as Microsoft or Adobe it has had a hard time being recognized. At present it is used mostly for web graphics however Internet Explorer does not support the variable transparency feature.

PSD

PhotoShop document (PSD) is the format used by Adobe PhotoShop for saving projects which can contain photographs, graphics, layers and text.

USES

Primarily used for saving projects for further refinement in PhotoShop other programs such as Adobe In Design can open and manipulate these files and QuarkXpress can also do some editing of the files.

TIFF

Tagged Image File Format (TIFF) is files that are saved completely uncompressed giving maximum quality in 24 bit color. It is a superior format for printing high-resolution photographs or other raster (pixel based) images.

USES

After downloading files from a digital camera they most likely will be in the JPEG format. It is useful if they are saved as TIFF files before any manipulation is done in image processing software and only changed to a JPEG image when all is done and you are ready to send the files to another person or onto the web.

Finally there is the comparative new kid on the block the **RAW** format.

A raw image file contains minimally processed data from the image sensor of a digital camera or image scanner. Raw files are so named because they are not yet processed and ready to use with an editor, or printed. Normally, the image must be processed and converted to an RGB format such as TIFF or JPEG before it can be manipulated.

There is no single RAW format; different manufacturers use their own proprietary formats, which are collectively known as RAW format. Manufacturers have their own file extensions for RAW images such as .raf for Fuji cameras, .crw for Canon, .orf for Olympus etc.

Raw files contain pixel data from the image sensor usually at 12 or 14 bits per individual sensor bucket. These pixels are a mosaic of red, blue or green values. The sensor is filtered with dye to direct the correct color of light into each bucket; this is called a Bayer filter. To retrieve an image from a RAW file this mosaic must be converted into an RGB image. This is known as Demosaicing, but this process is referred to by many manufacturers as Digital Development.

The contents of RAW files are often considered to be of 'higher quality' than the RGB converted results. Each pixel in RAW is represented by a higher range number. Transformations which affect brightness or color curve lose less information when performed on the raw data. This does not mean that an 8 MB RAW file is of higher quality than an 8 MB RGB file. It simply means that less information is lost in these particular transformations.

The drawback for this format is that although programs such as Adobe PhotoShop CS2 and Microsoft Digital Imaging can "read" some RAW formats there has been a lot of confusion with the proliferation of different formats from the camera manufacturers. There has been some attempts made to standardize these but as of this writing there still is not a universal agreement.

Another drawback of this format is file size. Files are typically 2 to 6 times larger than the standard picture files on a digital camera which means fewer images on a memory card. Additionally it also takes much longer for the image to be written to a card which makes taking pictures quickly in succession (such as sporting events) problematic.

Until some of these issues are resolved it is probably better to regard the RAW format as a bit of a novelty for all but the very serious professional photographer.

I hope this has guide has been of use to you and now please go on to:

Part 2, a Guide to Resolution, Size and Printing.