Image Processing Digital Assignment 1

CASE STUDY OF VARIOUS IMAGE FORMATS

Om Ashish Mishra – 16BCE0789 – G2

Common Image File Formats

There are numerous image file types out there so it can be hard to know which file type best suits your image needs. Some image types such a TIFF are great for printing while others, like JPG or PNG, are best for web graphics.

The list below outlines some of the more common file types and provides a brief description, how the file is best used, and any special attributes the file may have.

Bitmap (.bmp)

BMP or Bitmap Image File is a format developed by Microsoft for Windows. There is no compression or information loss with BMP files which allow images to have very high quality, but also very large file sizes. Due to BMP being a proprietary format, it is generally recommended to use TIFF files.

Compression: None
Best For: High quality scans, archival copies

Pros of BMP:
- Works well with most Windows programs and OS, you can use it as a Windows wallpaper

Cons of BMP:
- Does not scale or compress well
- Again, very huge image files making it not web friendly
- No real advantage over other image formats

JPEG (.jpg, .jpeg)

JPEG, which stands for Joint Photographic Experts Groups is a "lossy" format meaning that the image is compressed to make a smaller file. The compression does create a loss in quality but this loss is generally not noticeable. JPEG files are very common on the Internet and JPEG is a popular format for digital cameras - making it ideal for web use and non-professional prints.

Compression: Lossy - some file information is compressed or lost
Best For: Web Images, Non-Professional Printing, E-Mail, Powerpoint

Special Attributes: Can choose amount of compression when saving in image editing programs like Adobe Photoshop or GIMP.

Pros of JPEG:
- 24-bit color, with up to 16 million colors
- Rich colors, great for photographs that need fine attention to color detail
- Most used and most widely accepted image format
- Compatible in most OS (Mac, PC, Linux)

Cons of JPEG:
- They tend to discard a lot of data
- After compression, JPEG tends to create artifacts
- Cannot be animated
- Does not support transparency

GIF (.gif)

GIF or Graphics Interchange Format files are widely used for web graphics, because they are limited to only 256 colors, can allow for transparency, and can be animated. GIF files are typically small is size and are very portable.

Compression: Lossless - compression without loss of quality
Best For: Web Images
Special Attributes: Can be Animated, Can Save Transparency

Pros of GIF:
- Can support transparency
- Can do small animation effects
- 'Lossless' quality–they contain the same amount of quality as the original, except of course it now only has 256 colors
- Great for images with limited colors, or with flat regions of color

Cons of GIF:
- Only supports 256 colors
- It's the oldest format in the web, having existed since 1989. It hasn't been updated since, and sometimes, the file size is larger than PNG.

PNG (.png)

PNG or Portable Network Graphics files are a lossless image format originally designed to improve upon and replace the gif format. PNG files are able to handle up to 16 million colors, unlike the 256 colors supported by GIF.

Compression: Lossless - compression without loss of quality
Best For: Web Images
Special Attributes: Save Transparency

Pros of PNG:

- Lossless, so it does not lose quality and detail after image compression
- In a lot ways better then GIF. To start, PNG often creates smaller file sizes than GIF
- Supports transparency better than GIF

Cons of PNG:
- Not good for large images because they tend to generate a very large file, sometimes creating larger files than JPEG.
- Unlike GIF however, it cannot be animated.
- Not all web browsers can support PNG.

TIFF (.tif, .tiff)

TIFF or Tagged Image File Format are lossless images files meaning that they do not need to compress or lose any image quality or information (although there are options for compression), allowing for very high-quality images but also larger file sizes.

Compression: Lossless - no compression. Very high-quality images.
Best For: High quality prints, professional publications, archival copies
Special Attributes: Can save transparencies

Pros of TIFF:

- Very flexible format, it supports several types of compression like JPEG, LZW, ZIP or no compression at all.
- High quality image format, all color and data information are stored
- TIFF format can now be saved with layers

Cons of TIFF:
- Very large file size–long transfer time, huge disk space consumption, and slow loading time.

In a Nutshell

There is no universal image format that is best for all scenarios. Every type of image format has their own advantages and disadvantages. Here is a summation of each image format, their pros and cons, as well as when and where it's best to use them.

Original file   .tiff

.bmp   .jpg

.gif   .png

Print Graphics: TIFF is the best and only choice for professionals when images are intended for print. Its ability to read CMYK and YcbCr color, plus its ability to store such high pixel intensity makes it the only choice for designers, photographers and publishers.

Web Graphics: PNG, JPEG and GIF are the most web friendly image formats there is. JPEG is great for images when you need to keep the size small, such as when you need to upload it online. If you don't mind compromising the quality of the image a bit, use JPEG. If you want to keep the size small, but still retain the image quality, use PNG. GIF is the worst choice, although file sizes are very small, and they load very fast. Plus, if you want to add animation effects, use GIF.

PC & Mac Compatibility: If you are using Mac or PC, or constantly shifting from one to another, JPEG is the best image format for PC and Mac Compatibility.

Logos & Line Art: JPEG is the worst choice, it tends to add artifacts and blur the text, line and edges. JPEG also cannot support transparency, which is often a need for logos or icons. GIF is a good choice, but it pales in comparison to TIFF and PNG.
Both of the latter image formats are lossless, store as much image information, and are not limited to 256 colors, unlike GIF. They also don't add artifacts (the downfall of JPEG) and keep the logo or line art sharp and concise.

Clip Art: GIF is the best image for clipart and drawn graphics that only use few colors and precise lines & shapes.

Original file

.tiff

.bmp

.jpg

.gif

.png

EPS (.eps)

An EPS or Encapsulated PostScript file is a common vector file type. EPS files can be opened in many illustration applications such as Adobe Illustrator or CorelDRAW.

Compression: None - uses vector information
**Best For:** Vector artwork, illustrations
Special Attributes: Saves vector information

Pros of EPS:

- You need to send a **vector logo** to a client, designer or a printer. With an EPS file, you don't have to worry about where the logo will be placed or printed. No matter the size, it will always appear at the correct resolution.

Cons of EPS:

- You're dealing with photographs or artwork. EPS can handle raster images, but this type of image file is primarily for vectors. Work with a PSD, TIF or JPEG when you have a photo project.
- You need to display an image online. Export to JPEG, PNG or GIF first.
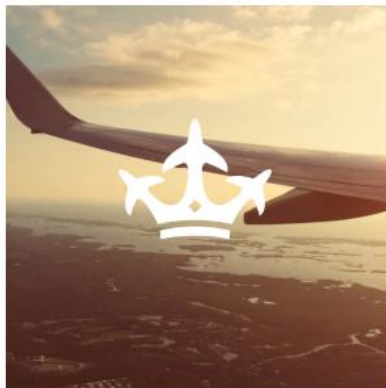
by artsigma

by Dusan Klepic

by Sava Stoic

Fig: The image of .eps format

RAW Image Files (.raw, .cr2, .nef, .orf, .sr2, and more)

RAW images are images that are unprocessed that have been created by a camera or scanner. Many digital SLR cameras can shoot in RAW, whether it be a .raw, .cr2, or .nef. These RAW images are the equivalent of a digital negative, meaning that they hold a lot of image information, but still need to be processed in an editor such as Adobe Photoshop or Lightroom.

Compression: None
Best For: Photography
Special Attributes: Saves metadata, unprocessed, lots of information

Pros of RAW

- You are **shooting and editing photos**. Make sure your camera is set to RAW so you can capture the most versatile image. Then, use a compatible photo-editing application to adjust your image.

Cons of RAW

- You're working with web graphics. RAW is built for photo editing. When you're ready to present your photos for the web, convert them to JPEG.
- You're ready to print your photos. Many printers won't accept raw formats, so first convert to JPEG or TIFF.

Fig: The Abode View of a .raw image