PHOTOSHOP 7

Optimizing Images for Web Publication

While audio and video content may be "cooler," and text-based content, databases, and hyperlinks are the main stock and trade of the Internet, it's the bitmapped graphics that rule the Web. They make the Web intelligible and invite us to come back for more. From the moment Mark Andreessen introduced the <img> tag to embed graphics into HTML documents, it's been those graphics that have brought the masses to the Web.

Choosing the right Web Graphic Format
If you have any experience with the Web, you know that small images are speedy images. Physically small images are flexible, b/c they can coexist w/ text and other elements on a page displayed on a low-resolution screen. Meanwhile, disk size affects speed. A 20K images that fills your screen takes less time to download and display than a 50K file no larger than a sticky note. It's the act of getting the data through the network lines, routers, cables, and modems that takes the time.

In a nutshell, Optimizing an image for use on the Web is a process of reducing that image to its smallest possible file size (to facilitate quick downloading) while maintaining the highest level of clarity and fidelity.

Three graphic file types are generally supported by Web browsers:
GIF: Graphics Interchange Format.
JPG/JPEG: Joint Photographic Experts Group
PNG: Portable Network Graphics format.
The trick is to know which format to use for the type of image you've created. What follows is a rundown of the strengths and weaknesses of these three Web file formats.

When talking about image formats, you have to talk about bits. Bits are the smallest units of data computers work with, and the number of bits a format can devote to each pixel determines the maximum number of colors the format can display. Time for some new terms:

Bit depth: This is the total number of bits a file format is capable of devoting to each pixel. This state determines the total number of colors a format can display in a single image, which is our next term:

Color depth. This is the total number of colors a format can display in a single image. For example, .GIF files can display a total of 256 colors in a single image, therefore .GIF files have a color depth of 256. Pretty simple, right?

A format's color depth is calculated this way: we begin by taking the number of states a bit has—which is two (one state being on, the other being off)—and raise that number to the power indicated by the format's bit depth.

GIF
.GIF is an 8-bit format, meaning it can devote 8 bits of data to each pixel. So, using our handy little equation, this makes its color depth 2 to the power of 8 (2x2x2x2x2x2x2x2),

which totals 256. This is the first of GIF's strengths: a lower color depth helps ensure a low file size.

GIF's next major strength is how it compresses file data. GIF uses a compression method called LZW, after its creators Lempel, Ziv and Welch. When turning an image into a GIF file, this compression method exploits inefficiencies in the file's data structure, effectively removing unused space within the file. Consequently no additional info is removed from the image. In technobabble, LZW compression is called a "lossless" compression method b/c no image data is lost in the process.

If GIF only supports a maximum of 256 colors in an image, then it follows that you wouldn't try to optimize an image with thousands of colors into this format. **GIF is best suited for images with a limited number of total colors**, preferable with a high degree of contrast where the edges at which two colors meet are sharply defined.
Sadly, GIF doesn't support multiple levels of transparency. GIF supports binary transparency, meaning a pixel is either transparent or it's not. GIF is also capable of animation.
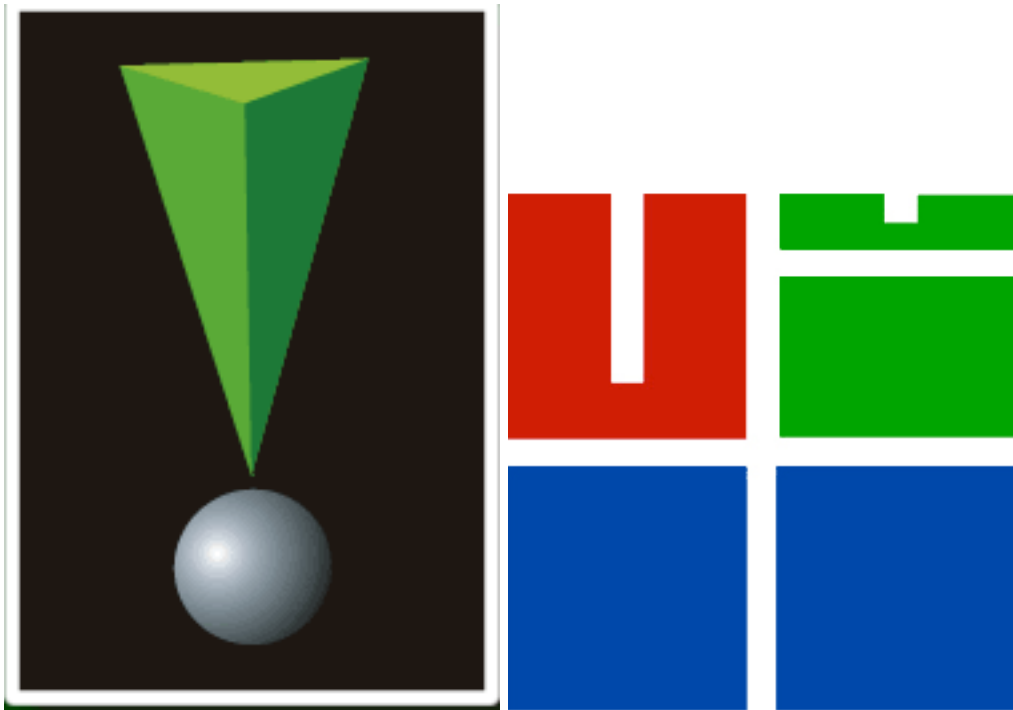
GIF's major strengths—limited number of total colors per image; a lossless compression method, and a liking for regions of solid color—when looked at from another perspective, are also the format's major weaknesses. After all, what do you do if your image has millions of colors that fade from one to the next all over the place? Like the average color photograph?

JPEG
Members of the Joint Photographic Experts Group represent a wide variety of companies and academic institutions throughout the world who meet to discuss and

create the standards for still-image compression. The standards they developed for continuous-tone images—images with an unlimited range of color or shades of gray— were used to create the JPG format.

JPG has a bit depth of 24, giving it a color depth of 2 to the power of 24, or 16,777,215 colors. It's method of compression reduces file size by removing "unessential" data from the image. What is "unessential data"? The JPG format takes advantage of certain limitations inherent in the human eye. Our eyes perceive minute changes in brightness better than they perceive equally minute changes in color. JPG's compression method favors changes in brightness, discarding colors the eye won't necessarily miss, while still reproducing up to 16,777,215 colors. When viewing the image on a 72 dpi monitor, we humans perceive an image we consider highly detailed.

B/c JPG's compression removes data it is referred to as a "lossy" compression method. The degree of compression is adjustable, allowing you to choose how much data is lost. The higher you compress the file, the smaller its size. The less you compress it, the better the image quality.

The type of images best optimized in the JPG format can be deduced from the name— photographs and photo-realistic images. In other words, images with millions of colors or shades of gray, heavy degrees of gradation, where large zones of single colors are few. Avoid using JPG to optimize images with large zones of a single color. JPG compression introduces distortions (called artifacts) when attempting to render them.
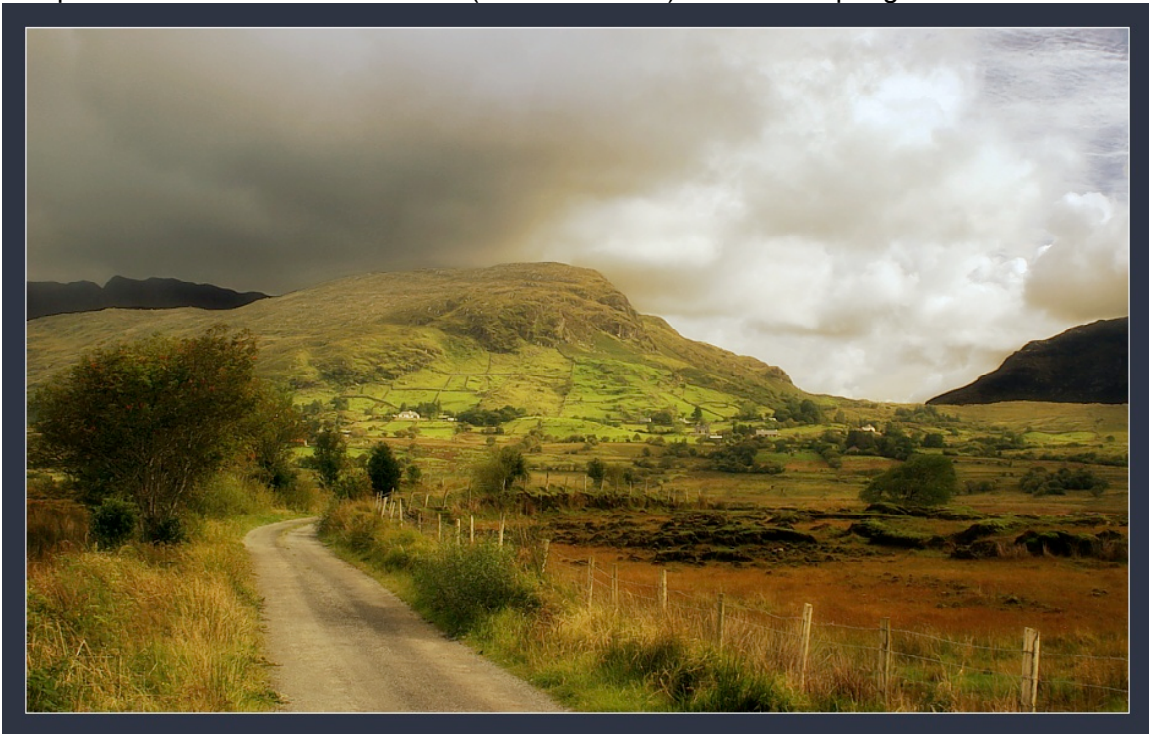
Good example of a JPG image.

PNG (ping)
Portable Network Graphics
This format has an interesting history. When Unisys, the owner of the patent on LZW compression, began demanding royalty payments eight years after the format's

introduction, some confusion erupted and there were those who thought the royalties would be levied against anyone who so much as used a GIF image in a Web site. This confusion turned out to be a boon for graphics artists when the Internet Engineering Task Force produced its answer to GIF—PNG, a format that used a lossless compression method AND came in 8-bit and 24-bit flavors, effectively combining the best aspects of both GIF and JPG.

Used in its 8-bit version, PNG and GIF are fairly even in their abilities to produce quality images with low file sizes. PNG tends to produce slightly larger files, but only by a kilobyte or two, and is fine for optimizing the same sort of images GIF should be used for.

The 24-bit version of PNG does not, however, compare with JPG. Because the compression method is lossless (removing no additional data from the image), files optimized in this format tend to be double the size than when optimized in the JPG format.

PNG was designed for transferring images on the Internet, not professional graphics, and so does not support other color spaces (such as CMYK).
PNG also supports transparency. It offers binary transparency equivalent to GIF. It also has a more impressive version, called alpha transparency, which gives the format something Photoshop users can wrap their brains around—a mask channel. In total, PNG supports 256 levels of transparency from fully opaque to completely transparent, with 254 stops in between. Most modern browsers support PNG's variable transparency.

OPTIMIZING for the WEB
In the 1990s, Photoshop received a fair amount of flak for its relatively paltry collection of Web-savvy features. Adobe explained that that's what ImageReady was for…and Photoshop was for Print Graphics. But most Web designers had no interest in using ImageReady, and kept grousing, and finally Adobe caved and started to build in Web features into Photoshop.
Now ImageReady has actually been folded completely into Photoshop.
Most of ImageReady's commands work the same as those in Photoshop. The **Save For Web** dialog box is the condensed version of the ImageReady interface, containing all its key optimization features. Here you preview your optimized image, selecting the format, compression, and color options.

To display the **Save For Web** box choose File>Save for Web.

In the **Save For Web** dialogue box you compare your original image with the optimized results, deciding which optimization settings prove best for your image. The annotation area beneath the original image displays the file name and file size. Beneath the optimized image, the current optimization settings, file size, and estimated download time are shown.

Demonstrate:
1. Choose File > Save For Web
2. Click a tab at the top of the dialog box to select a display option: Optimized, 2‑Up, or 4‑Up. If you select 4‑Up, click the preview you want to optimize.

3. Select a preset optimization setting from the **Preset** menu, or set individual optimization options. The available options change depending on the file format you select. See one of the following lists of settings:

Optimization options for GIF and PNG-8 formats
Optimization settings for GIF
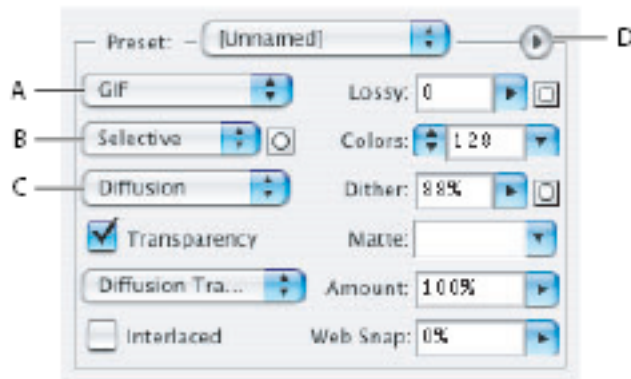
A. File Format menu B. Color Reduction Algorithm menu C. Dithering Algorithm menu D. Optimize menu

Lossy (GIF only) Reduces file size by selectively discarding data. A higher Lossy setting results in more data being discarded. You can often apply a Lossy value of 5–10, and sometimes up to 50, without degrading the image. The Lossy option can reduce file size by 5% to 40%.

Note: You cannot use the **Lossy** option with the Interlaced option or with Noise or Pattern Dither algorithms

Color Reduction Method and Colors Specifies a method for generating the color lookup table and the number of colors you want in the color lookup table. You can select one of the following color reduction methods:

Perceptual Creates a custom color table by giving priority to colors for which the human eye has greater sensitivity.

Selective Creates a color table similar to the Perceptual color table, but favoring broad areas of color and the preservation of web colors. This color table usually produces images with the greatest color integrity. Selective is the default option.

Adaptive Creates a custom color table by sampling colors from the predominant spectrum in the image. For example, an image with only the colors green and blue produces a color table made primarily of greens and blues. Most images concentrate colors in particular areas of the spectrum.

 (Restrictive) Web Uses the standard 216-color color table common to the Windows and Mac OS 8-bit (256-color) palettes. This option ensures that no browser dither is applied to colors when the image is displayed using 8-bit color. (This palette is also called the web-safe palette.) Using the web palette can create larger files, and is recommended only when avoiding browser dither is a high priority.

Custom Uses a color palette that is created or modified by the user. If you open an existing GIF or PNG-8 file, it will have a custom color palette.

Use the Color Table palette in the Save For Web dialog box to customize the color lookup table.

Black and White, Grayscale, Mac OS, Windows Use a set palette of colors.
Dither Determines the method and amount of application dithering.

Dithering refers to the method of simulating colors not available in the color display system of your computer. A higher dithering percentage creates the appearance of more colors and more detail in an image, but can also increase the file size. For optimal compression, use the lowest percentage of dither that provides the color detail you require. Images with primarily solid colors may work well with no dither. Images with continuous-tone color (especially color gradients) may require dithering to prevent color banding.
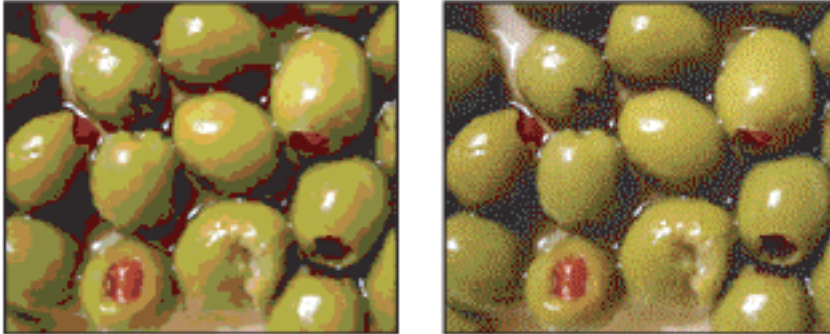
GIF image with 0% dither (left), and with 100% dither (right)
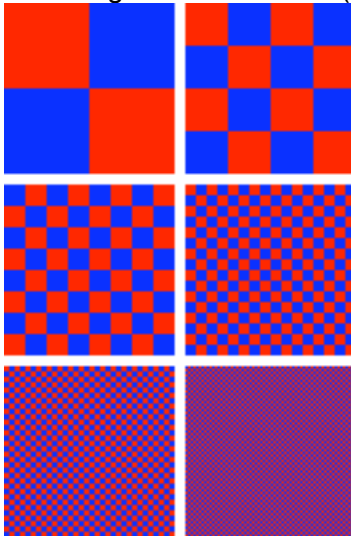
Dithering is a technique used in computer graphics to create the illusion of color depth in images with a limited color palette (color quantization). In a dithered image, colors not available in the palette are approximated by a diffusion of colored pixels from within the available palette. The human eye perceives the diffusion as a mixture of the colors within it (see color vision). Dithering is analogous to the halftone technique used in printing. Dithered images, particularly those with relatively few colors, can often be distinguished by a characteristic graininess, or speckled appearance.

Diffusion Applies a random pattern that is usually less noticeable than Pattern dither. The dither effects are diffused across adjacent pixels.
**Pattern** Applies a halftone-like square pattern to simulate any colors not in the color table.
Noise Applies a random pattern similar to the Diffusion dither method, but without diffusing the pattern across adjacent pixels. No seams appear with the Noise dither method.

Transparency and Matte Determines how transparent pixels in the image are optimized.

- To make fully transparent pixels transparent and blend partially transparent pixels with a color, select Transparency and select a matte color.
- To fill fully transparent pixels with a color and blend partially transparent pixels with the same color, select a matte color and deselect Transparency.
- To select a matte color, click the Matte color swatch and select a color in the color picker. Alternatively, select an option from the Matte menu: Eyedropper (to use the color in the eyedropper sample box), White, Black, or Other (to use the color picker).

Optimization options for JPEG format
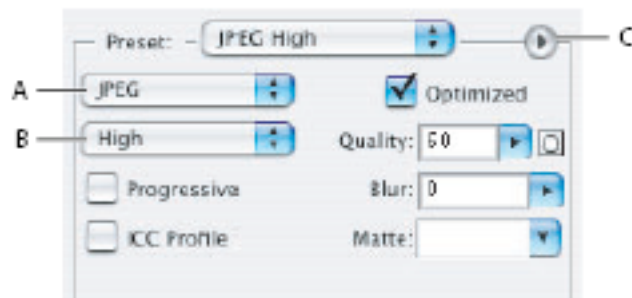
A. File Format menu B. Compression Quality menu C. Optimize menu

Quality Determines the level of compression. The higher the Quality setting, the more detail the compression algorithm preserves. However, using a high Quality setting results in a larger file size than using a low Quality setting. View the optimized image at several quality settings to determine the best balance of quality and file size.

Optimized Creates an enhanced JPEG with a slightly smaller file size. The Optimized JPEG format is recommended for maximum file compression; however, some older browsers do not support this feature.

Progressive Displays the image progressively in a web browser. The image appears as a series of overlays, enabling viewers to see a low-resolution version of the image before it downloads completely. The Progressive option requires use of the Optimized JPEG format.

Note: Progressive JPEGs require more RAM for viewing and are not supported by some browsers.

Blur Specifies the amount of blur to apply to the image. This option applies an effect identical to that of the Gaussian Blur filter and allows the file to be compressed more, resulting in a smaller file size. A setting of 0.1 to 0.5 is recommended.

ICC Profile Preserves the ICC profile of the artwork with the file. Some browsers use ICC profiles for color correction. This option is available only after you saved an image with an ICC profile—it is not available for unsaved images.

Matte Specifies a fill color for pixels that were transparent in the original image. Click the Matte color swatch to select a color in the color picker, or select an option from the Matte menu: **Eyedropper** (to use the color in the eyedropper sample box), White, Black, or Other (to use the color picker).

Pixels that were fully transparent in the original image are filled with the selected color; pixels that were partially transparent in the original image are blended with the selected color. (Matte's are often used on shopping sites where a shirt appears in a variety of colors…these colors are just mattes filling a transparent area.

Optimization options for PNG-24 format
Transparency and Matte Determine how transparent pixels in the image are optimized:
To save an image with multilevel transparency, select **Transparency** and select **None** from the **Matte** menu.
To make fully transparent pixels transparent and blend partially transparent pixels with a color, select Transparency and select a matte color.
To fill fully transparent pixels with a color and blend partially transparent pixels with the same color, select a matte color and deselect Transparency.
To select a matte color, click the **Matte** color swatch and select a color in the color picker. Alternatively, select an option from the **Matte** menu: **Eyedropper** (to use the color in the eyedropper sample box), White, Black, or Other (to use the color picker).

Interlace Displays a low-resolution version of the image in a browser while the full image file is downloading. Interlacing can make downloading time seem shorter and can assure viewers that downloading is in progress. However, interlacing also increases file size.

Optimization options for WBMP format (Wireless Bitmap Format: a monochrome graphics file format optimized for mobile computing devices.)

5. Fine-tune the optimization settings until you are satisfied with the balance of image quality and file size.
6. Click Save in the Save For Web dialog box.
7. In the **Save Optimized As** dialog box, do the following, and then click **Save**:
   • Enter a file name, and select a location for the resulting file or files.
   • Select a Format option to specify what kind of files you want to save: HTML file and image files, only image files, or only an HTML file.

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