The reason for the amount of file types present today is because of the need of compression. Files vary in size, types allow for the variety in sizes. Compression schemes can be lossy or lossless.

**Lossy and Lossless compression**

Lossy compression – accepts degradation to images in order to achieve smaller file sizes

A lossy algorithm might store color information at a lower resolution than the image itself, this is due to the eye lack of sensitivity to color change in small distances

Lossless compression – Looks for efficient ways to represent an image while maintaining accuracy

A lossless algorithm might look for a recurring pattern in the file, and replace occurrences with short abbreviations, cutting file size

**Number of Colors**

The simplest of images only has two colors, black and white, needing only a bit represent each pixel. As time progressed, more and more colors were able to be shown on screen. At a time, it was standard to only be able to show 256 colors out of a pool of 224 at a single time, this was possible by devoting 16 bits to each pixel. Now a days, it is possible to devote 24 bits to each pixel, making it possible to display 224, or 16 million colors without restriction. The eye has trouble distinguishing between similar colors, 24 bit or 16 million colors is often called TrueColor.

**Image File Types**

TIFF – A flexible format capable of both lossless and lossy algorithms. In practice, it has become a lossless method without compression, causing image sizes to be quite big.

PNG – Lossless storage format that looks for pattern in an image for compression, without loss of accuracy.

GIF – Creates a table of up to 256 colors from a pool of 16 million. If the image has fewer than 256 colors, GIF can render the image exactly, meaning anymore will result in a loss of accuracy. Gif achieves compression by first reducing the number of colors of color-rich images, which results in a reduction of bits needed per pixel. It also replaces commonly occurring pattern with a short abbreviation, “white white white white white” to “5 white”

JPG – Optimized for photographs. Can achieve amazing compression ratios while maintaining very high image quality. Analyzes images and discards information that the eye is likely not to notice. It stores information as 24 bit color. The degree of compression of jpg is adjustable.

RAW – Lossless, and smaller than TIFF, but the output comes straight from a manufacturer, meaning that there are cases where the image has to be viewed from the company’s software

BMP – Uncompressed proprietary format invented by Microsoft

PSD, PSP, etc. – Proprietary formats used by graphics programs. Mainly used to maintain editing progress and saving layers to build complex images.

Resources

http://users.wfu.edu/matthews/misc/graphics/formats/formats.html