OVERVIEW OF IMAGE FORMATS SUITABLE FOR PRESENTATION OF ART ON THE WWW

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An important aspect of image processing is the enormous amount of data which has to be handled when transmitting digital images. The efficient transmission of images is extremally important as the image data transfer takes up over 90 percent of the volume on the Internet. In this aspect computer data compression is a powerfull technology which is playing a vital role in the Information Age.

The compression of information can be devided into lossles and lossy techniques. In some cases such as text or financial data transfer only the losless algoritms can be applied. However when transmitting or storing digital images or music data, the application of losssy techniques is almost invisible to the user, but enables a drastic reduction of the data volume.

In this article we present some of the compression techniques which can be used when transmitting or storing digital images. All the formats we were able to gather are accompanied by a short description and an Internet link, which can be used when detailed information is needed. Our intention is to find the optimal compression format for presenting artistic images over the Internet. The first step of our project is the cataloging of the existing formats and evaluating their efficiency when transmitting data containing artistic features. In this short article we provide the reader with the substantial information on the existing formats and make some comments regarding their usage when presenting mages. In the next step we want to measure the efficiency of the algorithms and make some suggestions regarding their usage based on scientifical research.

This work is extremaly important and difficult as the most efficient formats are distributed on commercial basis and making any suggestions without sound scientific data is in our view not appropriate. That is why we present most of the existing formats but our intension is not their qualitative evaluation. We just show some of their advantages and drawbacks and the interested user has to find out the technique which best satisfies his needs.

Standard formats:

Name	Full name	WWW_page	Plu gin req.	Type	Max. Colors
GIF	Graphics Interchange Format	http://www.ora.com/centers/gff/specs.htm	No	Picture	256
PNG	Portable Network Graphics	Http://www.cdrom.com/pub/png	no	Picture	24 bit
JBIG	Joint Bilevel Group	http://www.pdsimage.com/html/news/jbig/faq.htm	yes	Picture	256 (gray)
JPEG	Joint Photographers Expert Group	http://www.ora.com/centers/gff/specs.htm	no	Picture	24 bit

New image formats (selected from over 40):

GIFX	Graphics Interchange Format –anim	http://www.webutilities.com/Tips/gifx-1.htm	yes	Picture/ ANIM	256
PTI	System for Progressive Transfer of Images	Http://server.hvzgymn.wn.schule-bw.de/pti/Intro/Index.htm	yes	Picture	24 bit
DJVU	Deja Vu	http://www.djvu.com	Yes	Picture/ Text	24 bit
FIF	Fractal Image Format	http://www.iterated.com	Yes	Picture	24 bit
SWF	Shockwave Fla0sh	http://www.macromedia.com	Yes	Picture/ Vector/A NIM	24 bit
FPX	FlashPix	http://www.livepicture.com	Yes	Picture	24 bit
WSQ	Wavelet Scalar Quantization	http://www.aware.com/products/compression/wsq.html	Yes	Picture	24 bit
MrSID	Multi-resolution Seamless Image Database	http://www.lizardtech.com	Yes	Picture/ Databas e	24 bit
FIF	Fractal Image Format	http://www.altamira-group.com	yes	Picture	24 bit
WIF	Wavelet Image Files	http://www.cengines.com/wavelet.htm	yes	Picture	24 bit
COD	Lightning Strike Image Compression	http://www.infinop.com/infinop/html/image_compress.html	yes	Picture	24 bit
SVG	Scalable Vector Graphics	http://www.ora.com/centers/gff/specs.htm	no in ms win	Vector	24 bit
LWF	LuraWave® image format	http://www.luratech.com/products/productoverview/fse.html	yes	Picture/ Databas e	24 bit

Graphics Interchange Format (GIF)

Surrounded by both popularity and controversy. Although limited to 256 colors and 95DPI resolution, GIF images are found in vast quantities and supported by most image-using software applications.

Portable Network Graphics (PNG)

The format was designed to replace the older and simpler GIF format and, to some extent, the much more complex TIFF format. For the Web, PNG has three main advantages over GIF: alpha channels (variable transparency), gamma correction (cross-platform control of image brightness), and two-dimensional interlacing (a method of progressive display). PNG also compresses better than GIF in almost every case, but the difference is generally only around 5% to 25%.

Joint Bilevel Group (JBIG)

JBIG is a data-encoding standard used to compress 1-bit, bilevel image data. JBIG is a prime example of a standard that does not define an interchange file format. The recent extensions to JPEG have defined a file format (SPIFF) that will also store facsimile and JBIG-compressed data.

Joint Photographic Experts Group (JPEG)

JPEG is a standardized lossy encoding method used for compressing truecolor and grayscale image data. JPEG if one of the most popular methods of data compression. JPEG data is stored in its raw form, or using the JFIF file format. Recent extensions to the JPEG standard have defined an official file format for JPEG (and others) named SPIFF.

Scalable Vector Graphics (SVG)

Work in progress at W3C (World Wide Web Consortium) on SVG, a vector graphics format written in XML and stylable with CSS, is expected to be a popular choice for including graphics in XML documents. It may be included either by linkage, or by textual inclusionin an XML document that uses a different namespace. Because SVG can itself include raster images such as JPEG and PNG, SVG can be used to add raster and mixed vector/raster graphics to XML documents

MrSID

MrSID (Multi-resolution Seamless Image Database) is a powerful wavelet based image compressor, viewer and file format for massive raster images that enables instantaneous viewing and manipulation of images locally and over networks while maintaining maximum image quality. Features include unprecedented compression ratios while maintaining highest image quality, true multiple resolutions, selective decompression, seamless mosaicking and browsing.

DJVU

AT&T Labs - Research has released an image compression program called DjVu. This format is particularly appropriate for web designers who wish to scan high-resolution colour images and deliver them over the Internet or Intranets.

WSQ

WSQ is a wavelet transform based compression standard designed by the FBI for compression of digital fingerprint images. Aware™ is the leading provider of WSQ solutions and has a customer base that includes major system integrators as well as livescan vendors and application developers. WSQ by Aware is 3 - 4 times faster than the next fastest commercial implementation of the WSQ algorithm

LWF

LuraImage is a scaleable Internet/Intranet frontend technology that enables access to image databases, utilizing the highly efficient LuraWave image format. LuraImage is a web-based database optimized for image communication in low-bandwidth environments - such as the internet.The usage of LuraWave-image compression rapidly speeds up the transmission of digital images in the internet. LuraWave images contain all user-relevant resolutions (thumbnail representation up to the original image size) as one image file. The very first bytes of an image transmission are used to generate a good image preview.

Lightning Strike Image Compression

Lightning Strike software delivers the most advanced image compression currently available. Consider the possibilities: Lightning Strike outperforms JPEG by 200 to 500 percent. In fact, on a 28.8 modem, a 1MB image file would take 90 seconds to download as a GIF image, 15 seconds as a JPEG image, and just 3 seconds as a Lightning Strike image. Speed plus quality is the clear advantage. At identical file sizes, Lighting Strike images have been judged significantly better than JPEG images.

Wavelet Image Files (WIF)

Are created using the groundbreaking advances in the mathematical compression method called "Wavelet Transform" made at the Houston Advanced Research Center (HARC™). By applying the complex wavelet algorithms to a digital image, the "compression engine" software is able to represent the image as a mathematical expression. The result is a compressed WIF file that can be 300 times smaller than the original image file size while still maintaining high image quality.

Fractal Image Format (FIF)

Fractal compression works by using a variety of methods to identify features within an image and then breaking down the image into a mathematically modeled series of repeating shapes and patterns. Fractal compression is very efficient, achieving compression ratios of up to 250:1; typical fractal compression ratios will range between 20:1 and 100:1. Images can be magnified or reduced, because the compression process allows the modeled images to be resolution-independent. When a fractally-encoded image is converted to a pixel image, it can be enlarged or reduced to any desired size with minimal loss of image quality. However, published reviews of fractal compression software indicate that there is probably a practical limit to how much a fractally-encoded image can be enlarged before there is a significant loss of image quality; perhaps up to 300% of the original size.