5.2.2 Image Formats and Storage

The *TIF* and *BMP* Formats

- The **TIF** (Tagged Image Format) or **BMP** (bit map) formats are simple: Everything will be stored to the fullest amount.
  - Every pixel is stored with the full information for brightness and **16** million colors
  - This means that a picture needs lots of memory space; it is thus perfectly unsuitable for **HTML** and cannot be incorporated directly.
  - It is, however, the format of choice to store your originals. You then optimize a *copy* of the original and store it in a **compressed** and **HTML** compatible format.

The JPEG Format

- The ***JPEG*** format compresses the image data by using a discrete cosine transformation algorithm (similar to Fourier transforms).
  - The compression algorithm is rather good; it also keeps the maximum color information (i.e. a palette of **16.7** million colors). Most of the graphic programs offer the possibility of choosing the compression factor.
  - With Paint Shop Pro you can choose the compression factor by activating the options in the "*save as*" ("Speichern als") menu.
  - A high compression factor leads to small file with a very low quality and vice versa: A low compression factor will lead to a larger file with a very high quality. Just have a look at the examples in the link or at the test picture below.
  - The **JPEG** format is a common format to present scanned photos or pictures with very fine color gradients in the Internet or as embedded files in Word documents. **JPEG** offers no opportunity to declare a transparent background.

The GIF format

- The ***GIF*** format was developed by CompuServe especially for on-line use. **GIF** compresses the size of an image by reducing the palette to **256** colors. This reduces the bit size of an image to $^{1}/_{10}$ to $^{1}/_{30}$ compared to a regular **BMP** file without noticeable losses. The **GIF** format offers several options for including the image into a web page:
  - **Transparent background:** One of the at most **256** colors of the image can be declared to be "transparent"; it will then be substituted by the background color of the page.
  - **Interlaced presentation:** The image will be presented successively (layer by layer) while each layer shows more details.
  - **Animations:** Several **GIF** images can be connected to an **animation**; i.e. a short "comic strip".
- **GIFs** are best used for buttons, cliparts and other images with only a few colors or color shades, and particularly for drawings or texts presented as image, but not for high resolution photos. Again, look at examples in the link to appreciate this.

The PNG format

- The ***PNG*** format (portable network graphics) combines the advantages of the **JPEG** and the **GIF** formats:
  - Compression without noticeable losses
  - **16.7** million colors
  - Transparent background and interlacing
- However, it does not allow to chose the compression factor. So it may look good, but look at the size in comparison to the others in the examples.

Here is an example for the different ways of strong an image. It contains a photography, hard lines, many colors, and a continuous color transition. In the original **TIF** format it needs **152 kB**

- Note that **JPEG** needs the least amount of storage space, but has problems with hard lines on a clear background. The photography, however, still looks pretty good even at high compression.
- You can see the differences more pronounced if you compare the images by exporting them to Paint Shop Pro and enlarging them.

JPEG format with ***compression factor*** **1** ("Original") Storage Size is **58 kB**.	JPEG format with *compression factor* **25** Storage Size is **15 kB**.
	
JPEG format with *compression factor* **50** Storage Size is **10 kB**.	JPEG format with *compression factor* **75** Storage Size is **7 kB**.
	
GIF format. Storage Size is **43 kB**	**PNG** format. Storage Size is **79 kB**