

## 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.

<p><b>JPEG</b> format with <i>compression factor 1</i> ("Original") Storage Size is <b>58 kB</b>.</p> 	<p><b>JPEG</b> format with <i>compression factor 25</i> Storage Size is <b>15 kB</b>.</p> 
<p><b>JPEG</b> format with <i>compression factor 50</i> Storage Size is <b>10 kB</b>.</p> 	<p><b>JPEG</b> format with <i>compression factor 75</i> Storage Size is <b>7 kB</b>.</p> 
<p><b>GIF</b> format. Storage Size is <b>43 kB</b></p> 	<p><b>PNG</b> format. Storage Size is <b>79 kB</b></p> 