*Tom Wilburg explains Mary that different computer programs use various ways to calculate their own information. It is very important to know which programs work with what kind of display format. Vector graphics usually need less memory than pixel graphics. Normally you can't handle continuous-tone images with a vector graphic program.*
Now read the text below.

The difference between pixel and vector graphics

There is a basic difference between pixel and vector graphics.

Pixel graphics use a grid of small, square picture elements (pixels) for displaying graphics. Each pixel has a particular position and a particular colour value. The total number of pixels in an image is always the same. If the image is enlarged, the resolution is reduced. Then the image often looks "jagged". If an interpolation is used the image looks smooth but not as sharp. Pixel graphics are created in drawing programs such as Microsoft Paint and MacPaint.

Vector graphics are created from mathematically defined lines (vectors) and curves. Vectors draw pictures on the basis of their geometrical characteristics. Vector graphics are not defined by a fixed number of pixels. Therefore they are not dependent on resolution. During expansion the contours are scaled without affecting the quality of the pictures or increasing the quantity of data. Vector graphics are always displayed or printed in the resolution of the relevant output device. Therefore they are suitable for showing sharp contours and details.
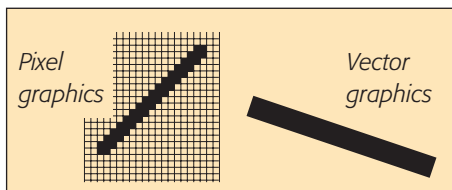
Well-known vector graphic programs are Macromedia Freehand, Adobe Illustrator, and CorelDraw. Exchange formats for vector graphics are, for instance, EPS (Encapsulated PostScript), WMF (Windows MetaFile), and MacPICT. These formats are metafiles, that means they can contain vectors as well as bitmaps. Scaleable fonts (Type 1 Fonts, True Type Fonts) are also made from vectors.

Source: ©H. Kipphan, Handbook of Print Media,
Springer 2001, ISBN 3-540-67326-1

The figures below show a comparison of vector graphics and pixel graphics.
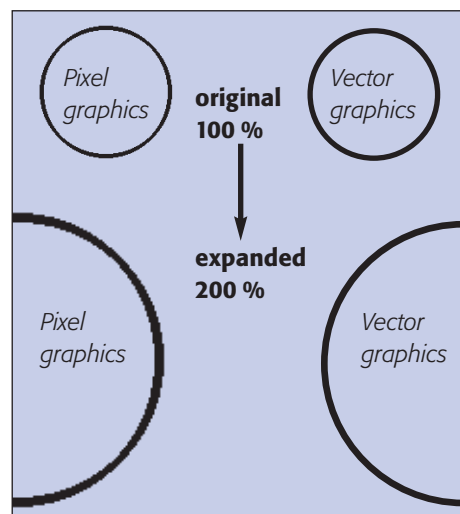
More about this topic

Questions about the text

1. Which two pieces of information do you need to describe a pixel?
2. How can you avoid that pixel graphics look jagged?

For experts: reflect on the text

1. Which of the programs on the right are pixel and which are vector programs?

Adobe Illustrator   QuarkXPress
Adobe Photoshop   InDesign
CorelDraw

2. Both circles are vector graphics.
   Which one uses more memory and why?

1.   **2.**
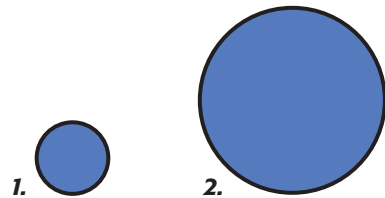
3. This photo should be expanded.
   What format do you need?

4. Is it possible to display vector graphics in a pixel graphic program?
5. Is it possible to display pixel graphics in a vector graphic program?
6. What could happen with the quality if you have reduced a pixel image?
   Is the quality the same or is it worse?

All about words

Find the opposites

Find the matching words

brief   enlarge   reduction   decrease   various   round   dependent

equal   increase

jagged   square   smooth

expansion   reduce   independent   detailed

Mary gets a CD from a customer while Rosi is in the recreation room drinking another cup of coffee. Mary loads the CD into the computer and finds a file named "brochure.pdf". XPress is unable to open this file format. She asks Tom how to open it and he explains to her the different kinds of data formats. He also gives her some information about this topic.

Data formats for digital pre-press

EPS (Encapsulated PostScript)

EPS is actually a page description language but is also used for describing images.

Purpose: A platform-independent printing format. EPS should not be used for screen presentation because images are not always displayed correctly.

Advantages: EPS has been a de facto standard within the graphic industry during the last fifteen years. It offers a very good printing quality on PS-printers. EPS is mostly used for storing vector information, which makes small files.

Disadvantages: There are sometimes problems when printing these files on printers that don't support the Postscript format.

GIF (Grafic Interchange Format)

GIF is in most cases used for screen presentation. It can also be used as animated GIF.

Purpose: GIF should be used on the Internet if the image only requires up to 256 indexed colours. Images that have more than 256 colours should be saved as JPEG.

Advantages: Most image software can import and export GIF-files. The file format offers extremely small files. That gives fast download and display on the net.

Disadvantages: Maximum 256 colours can be stored in the file. That means that there is always a quality loss when you use it for photos.

JPEG (Joint Photographics Experts Group)

You can compress images very much and so it is mostly used for large photos. JPEG is the most common format on the Internet.

Advantages: The format offers a very good compression, especially for photos. The compression will reduce the file size by approximately 5 to 20 times.

Disadvantages: The format uses a lossy compression. This means that you will loose information every time you save the image. You should not use JPEG as a master copy of your images.

PDF (Portable Document Format)

PDF is produced by Adobe Acrobat and the format is based on PostScript (PS) format.

Purpose: A cross application and platform description and publishing format.

Advantages: Very good printing quality. A standard in desktop publishing. All information will be stored inside a PDF.

Disadvantages: Only limited options to edit a PDF-file.

TIFF (Tagged Image File Format)

TIFF is one of the most common formats.

Purpose: Platform independent format for photos etc. TIFF has become a de facto-standard for halftone images.

Advantages: Platform independent (DOS, PC, Mac and UNIX). The format is supported in almost every image and word processing software.

Disadvantages: Large images require large storage space. And so it takes a long time to download something from the Internet.

More about this topic

Link the matching boxes

Read the boxes placed round Mary. Link the name of the data formats with the matching explanation in the blue box and then connect them with the yellow boxes which describe how these formats are mostly used.

For example:

| GIF | → | *This format …* | → | *It is used…* |

This data format is based on PostScript code. It can be imported into other programs. The embedded information can't be changed. Graphics in this format can be pixel as well as vector orientated.

Every computer can read this format. It uses indexed colours (up to 256), therefore the file size of pictures is strongly reduced. It's used for logos, graphics and images. The content of this format can be transparent, animated or interlaced.

This format is used for pixel graphics only. It can be handled on almost every platform. The information of a picture is stored in "tags". This format needs a large storage space. Therefore, the format offers a lossless compression (LZW).

JPEG
Joint Photographic Experts Group

PDF
Portable Document Format

GIF
Graphics Interchange Format

TIFF
Tagged Image File Format

EPS
Encapsulated PostScript

Based on PostScript, this format contains images, graphics, fonts and other information. The file size is very small and the quality of the data can be adjusted at the output. Additionally, the user can display the file and make changes in the document.

This is not only a format but also a way to compress. The advantage of this format is the small size of the file because data can be compressed high. There are several compression steps – the higher the compression rate, the greater the loss of quality.

Colour and gray level-pictures in every size and resolution can be saved in this format. It is the most commonly used data format to place pictures into dtp-programs.

It is used in several digital workflows and it's established as a standard for information interchange of complex data. It hasn't existed as long as the other formats.

This format is, because of its small size, mainly used in the Internet or in quantity-optimized pre-press workflows (newspapers). The distiller of Acrobat uses this format for compressing pictures in a PDF-File.

It's used for vector information as well as for image data that is not supposed to be manipulated by the user. You can store isolated figures, characteristic print lines and fonts with this format.

The function of this format is to display images on the Internet. The size is small and there are three variants to display them.
HTML uses this format to display pictures and graphics.