

Graphics and Presentations

Computer graphics

- Pictures by computers
- Pixelgraphic programs
- Vectorgraphic programas
- Charts (Business Graphics)
- Prezentation graphics
- Graphic file types
- Digital cameras

Pictures on the screen

- Picture = set of painted points
- Name of a single point: pixel
- Black and white screen: all pixels are black or white (gray?)
- On color monitors 4(!), 16, 256, 65 thousand or 16 million colors simultaneously
- 4 billions colors in printing

Colors

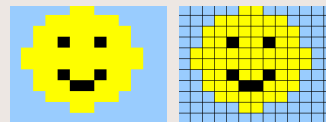
- Primary colors: Red, Green, Blue. Others are mixtures of them. (RGB)
- Number of colors hangs on the number of levels of basic colors:
- 256 levels of red, 256 levels of green, 256 levels of blue = 256^3 (16M) colors (color depth)
- In printing: Cyan, Magenta, Yellow, black (CMYK)
 - light cyan, light magenta (and so on ...)

Resolution

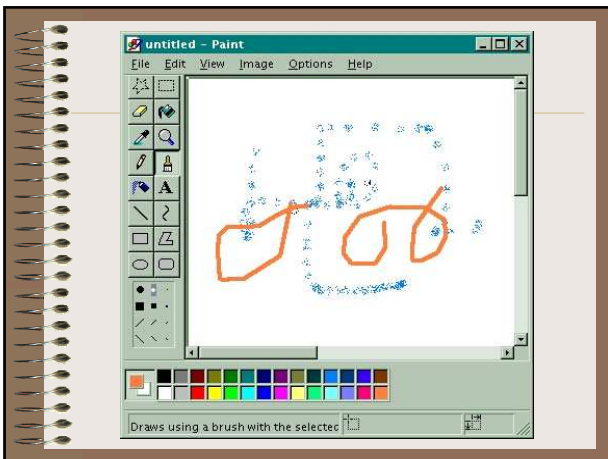
- Screen resolution: how many points are on the screen.
- 800 columns and 600 pixels in each: "800 x 600" (meaning 480000 pixels)
- 1024x768, 1240x1024, ...

Pixelgraphic programs

- Change directly the pixels



- Similar to freehand drawing
- Painted area can not be recovered any more
 - If did not manage layers



Pixelgraphic programs

- Resolution determines the quality (dots per inch, dpi)
- Enlarging the pictures the resolution will be lower, so curves become disjointed

Pixelgraphic programs

Original size



2x magnification



4x magnification



Pixelgraphic programs

6x magnification



Pixelgraphic programas

- All geometrical shapes will be converted to set of pixels and will be saved that way
- All pixels will be stored separately → large files
- Advanced programs are able to manage layers
- Several tools to manipulate the pictures (retouch, red-eye removal, special effects)
- Masking
- From home use to preparation for printing, or art.

Special effects...

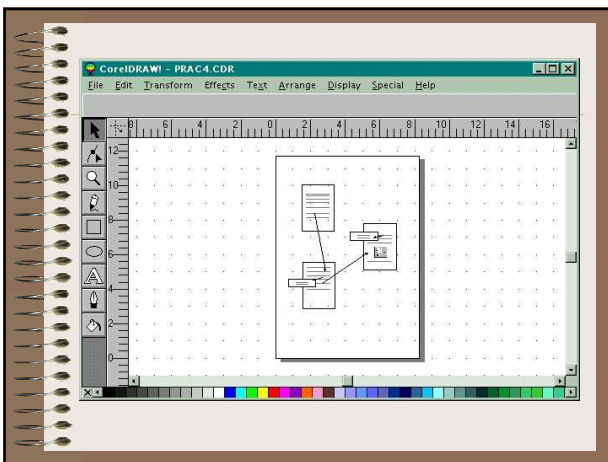


Pixelgraphic programs

- Adobe Photoshop (Elements)
- Paint Shop Pro
- Corel PhotoPaint
- Micrografix Picture Publisher
- Microsoft Paint ☺
- GIMP
- Google Picasa
- ...
- Viewing and cataloging programs

Vectorgraphic programs

- Pictures are sets of objects
- Only position and properties will be stored → small files
- E.g.: CorelDraw, Adobe Illustrator

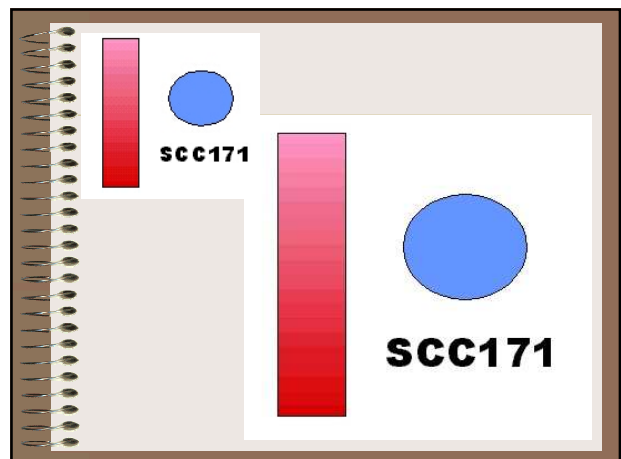


Vectorgraphic programs

- Geometrical objects (lines, rectangles, ellipses, ...)
- Objects have properties (line color, line width, fill color, transparency ...)

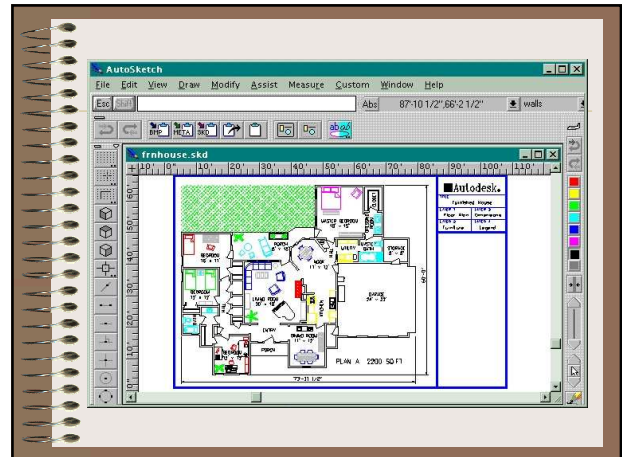
Vectorgraphic programs

- Shape and properties can be changed
- No resolution; pictures are scalable and device independent – they can be resized without losing quality



Vectorgraphic programs

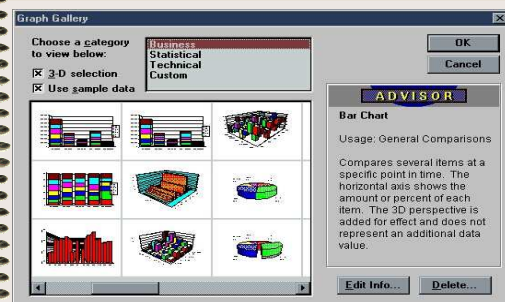
- Computer-aided design (CAD): special case, plans



Charts (Business Graphics)

- Demonstration of numbers, complicated data sets in different forms
- Words, data, pictures, arrows, other symbols...
- Easy to create in most spreadsheet editors

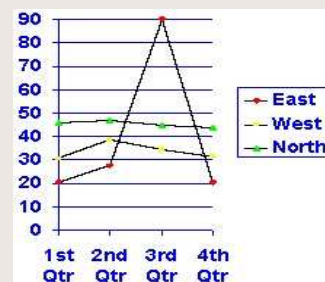
Which type to use?



Line graphs

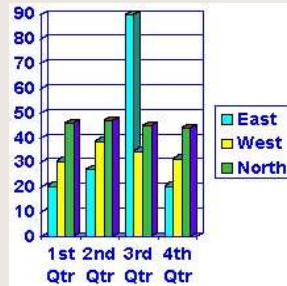
- Trends on a time interval, lot of data
- Ascending and descending lines
- Horizontal ("x") axis: time
- Vertical ("y") axis: the measured data values

Line graph - example



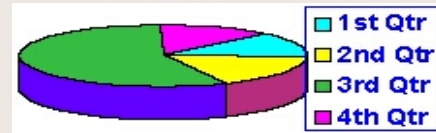
Column (Bar) Graph

Same, as the line graphs, with less data

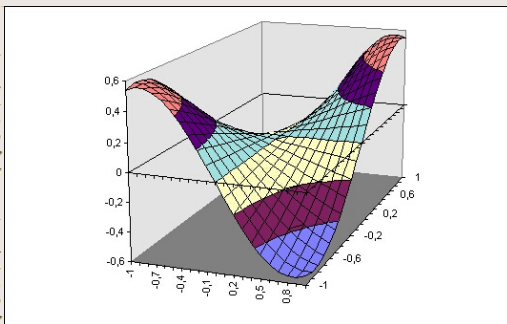


Pie Chart

➤ What is the proportion of the different parts

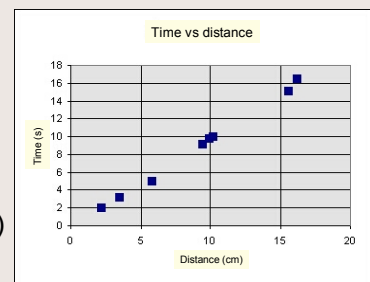


Surface



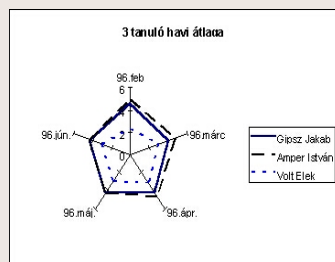
Scatter-plot

The connection of two variables (trendline, correlation)



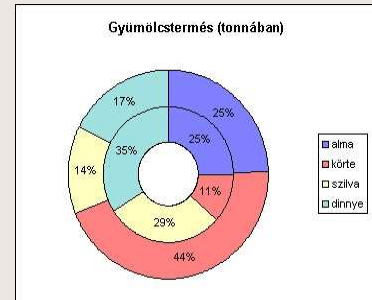
Radar

Special applications, e.g. microphone characteristics



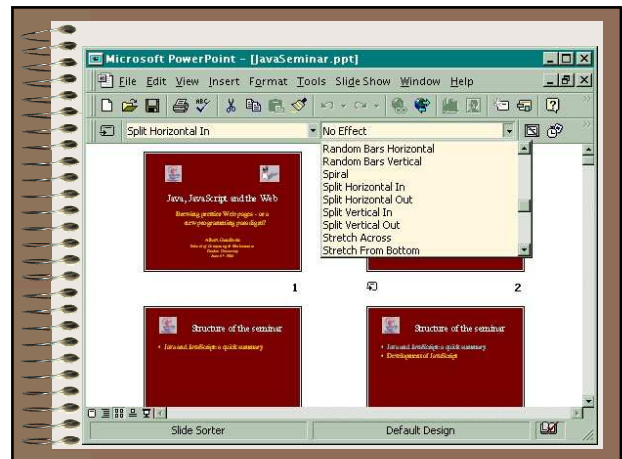
Doughnut

Pie-chart, with several data sets



Presentation

- Charts, pictures, slide shows
- Special effects
- Clip Art libraries
- Predefined templates
- E.g. Microsoft PowerPoint



Computer graphics

Realistic effects:

- Perspective
- Shadows
- Atmosphere (fog, mist, etc.)
- 3-D structure (e.g. skin)
- Wire frame, rendering, texture



Graphic file types: pixelgraphic files

- **BMP**
 - MS Windows format
- **GIF** (Graphics Interchange Format)
 - frequently used on the Internet; compressed type
 - ideal for drawing and homogenous areas
- **PCX**
 - PC format (scanners, faxes, several programs)

Graphic file types: pixelgraphic files

- **TIFF** (Tagged Image File Format)
 - widely used (PC and Macintosh)
 - extension: .tif
 - digital cameras (dying out)
- **WMF** (Windows Metafile Format)
 - Windows applications
 - pixelgraphic and vectorgraphic together
 - (might be a disaster...)

Graphic file types: pixelgraphic files

- **PNG** (Portable Network Graphics)
 - pixelgraphic format
 - instead of GIF
 - GIF contained licenced compression algorithm, while PNG contained a free one
 - newer versions of browsers support it
 - ... dying out... (I think)

Graphic file types: pixelgraphic files

- **RAW**
 - native format of digital cameras
 - more than 100 different formats (increasing...)
 - hangs on manufacturer and camera type
 - like the negative film without processing
 - Adobe DNG → new standard

Graphic file types: vectorgraphic files

- **CGM** (Computer Graphics Metafile)
 - widely used
- **DXF** (Data Exchange File)
 - most CAD programs support
- **PIC** (Lotus Picture File)
 - quite simple format, widely used

Compression

- **JPEG** (*Joint Photographic Experts Group*)
 - compression with loss of data
 - possibly 5% of original size only
 - details will be lost
- **WMP** (*Windows Media Photo*), or
- **HD Photo**
 - better than JPEG (?)
 - no quality loss on rotation by 90°

16k



12k



6k



3k



A freeware viewer

➤ IrfanView

- <http://www.irfanview.com/>
- to view and edit
- transformation between formats
- developer: Irfan Skiljan
- converts RAW!

Digital cameras

- aspect ratio 3:2 or 4:3 (or 16:9)
- megapixel (not soft!) → noise
- ISO → noise
- flash, place of external flash
- file type: RAW, TIFF, JPGs
- card type, size, speed (useful hardware)
- objective quality – chromatic aberration
- optical – digital zoom

- battery type (AA?)
- hand shaking – optical and electronical
- delay – manual mode
- operating modes!
- optical view finder – EVF – LCD - SLR
- menus or buttons
- accessories: lenses, UV-filter, polarizing filter (linear, circular), macro- and telephoto converter