Introduction to digital images

Information Technology

M.Bujacz

Raster graphics

Pixel vs print resolution
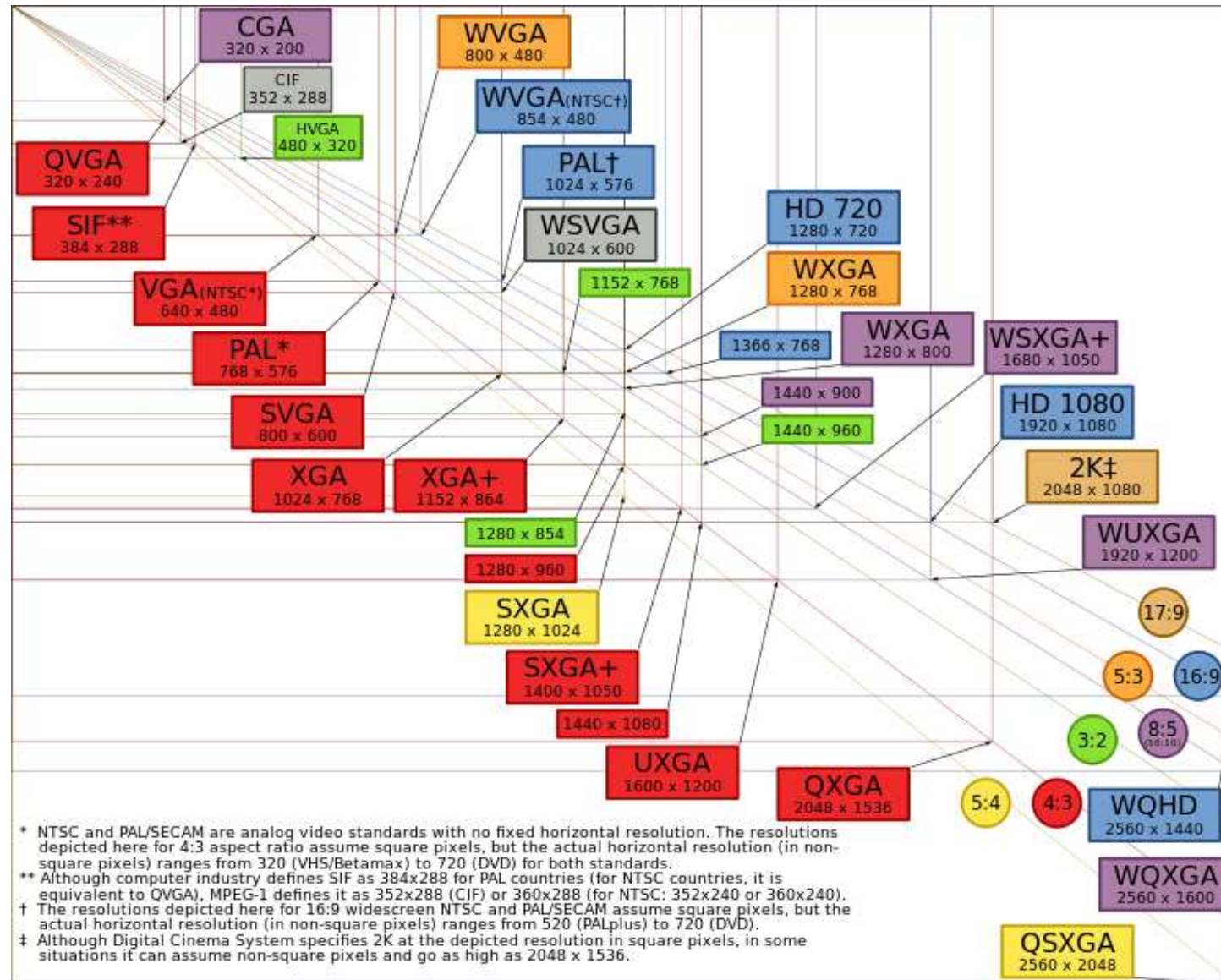
Color resolution a.k.a color depth
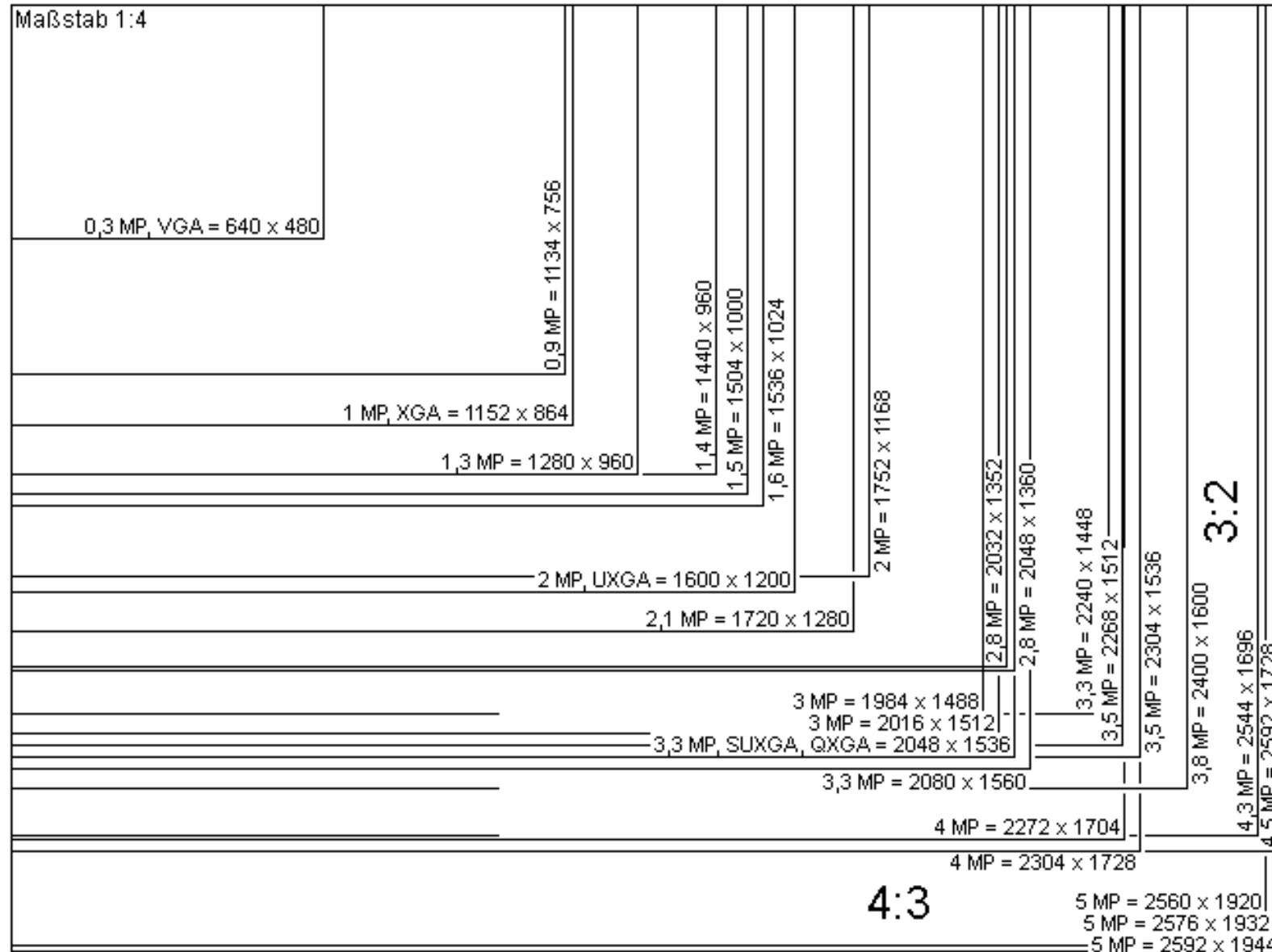
Compression standards

http://www.opticsinfobase.org/ol/abstract.cfm?uri=ol-35-16-2705

Pixel resolution (display)

http://en.wikipedia.org/wiki/Display_resolution

Pixel resolution (camera)

Maßstab 1:4

0,3 MP, VGA = 640 x 480

0,9 MP = 1134 x 756

1 MP, XGA = 1152 x 864

1,3 MP = 1280 x 960

1,4 MP = 1440 x 960

1,5 MP = 1504 x 1000

1,6 MP = 1536 x 1024

2 MP = 1752 x 1168

2 MP, UXGA = 1600 x 1200

2,1 MP = 1720 x 1280

2,8 MP = 2032 x 1352

2,8 MP = 2048 x 1360

3 MP = 1984 x 1488

3 MP = 2016 x 1512

3,3 MP, SUXGA, QXGA = 2048 x 1536

3,3 MP = 2080 x 1560

3,3 MP = 2240 x 1448

3,5 MP = 2268 x 1512

3,5 MP = 2304 x 1536

3,8 MP = 2400 x 1600

3:2

4 MP = 2272 x 1704

4 MP = 2304 x 1728

4,3 MP = 2544 x 1696

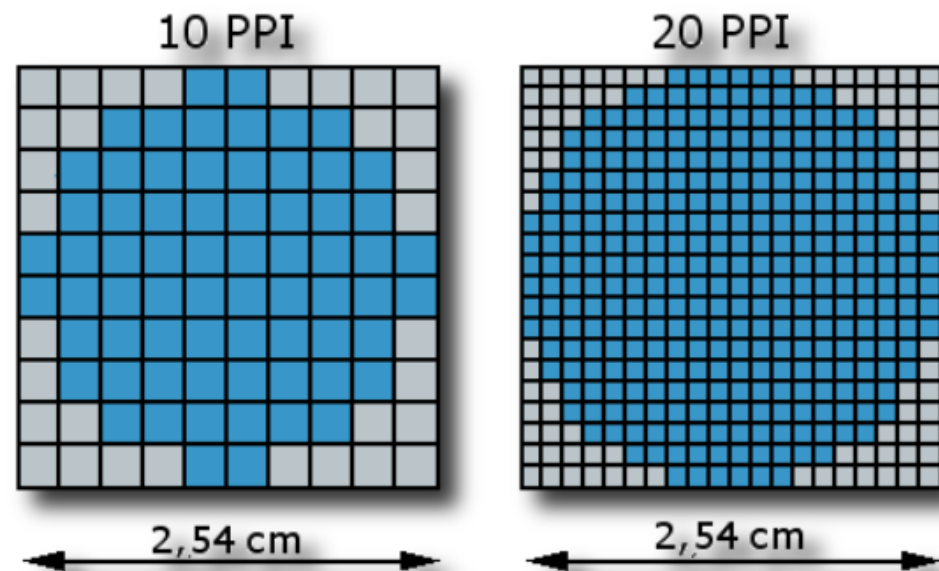4,5 MP = 2592 x 1728

4:3

5 MP = 2560 x 1920
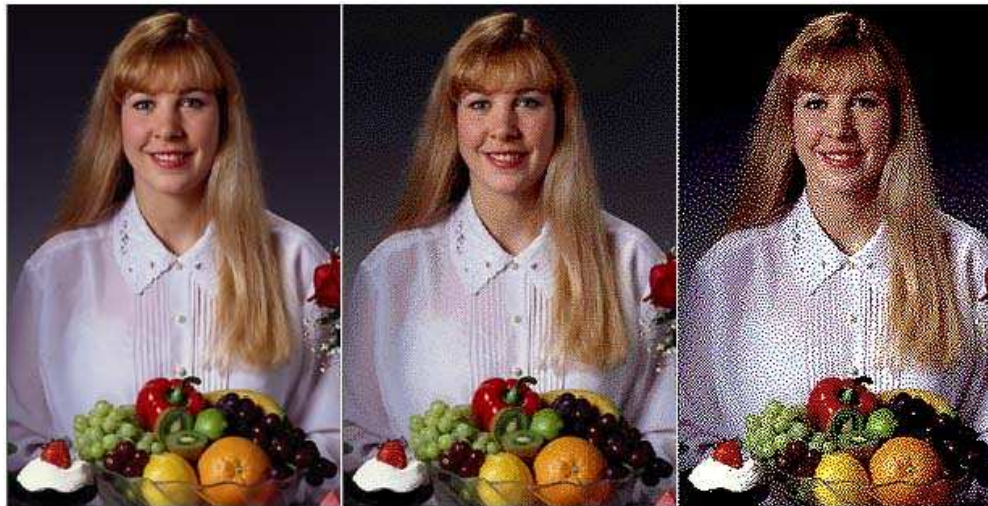
5 MP = 2576 x 1932

5 MP = 2592 x 1944

4

Print resolution (dpi)

Typical ~100 dpi for monitors, 300dpi for printers

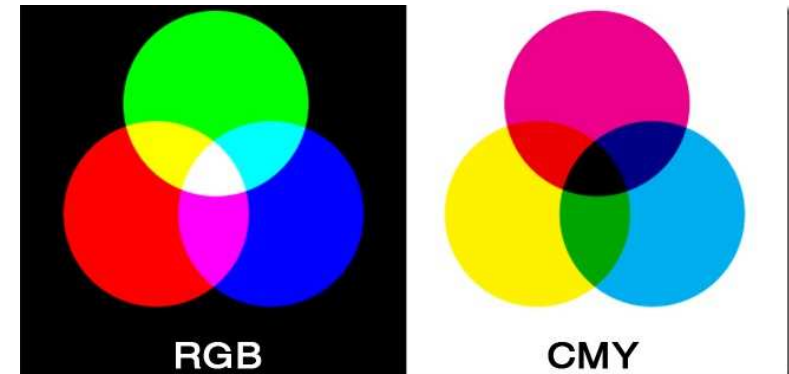E.g.: 2016x1512 (3MP) image printed at 300dpi would be roughly 7in x 5in

10 PPI	20 PPI
2,54 cm	2,54 cm

Color resolution/depth

True Color – 16 million colors (RGB 3x8=24 bits)

8bit color pallette – 256 colors

16.7 Million Colors 256 Colors 16 Colors

RGB CMY

http://www.inlineinc.com/tech/notes/technot2.htm

Compressed format - JPEG

Joint Picture Experts Group

Performs DCT on image and cuts off irrelevant details
  then performs normal lossless compression
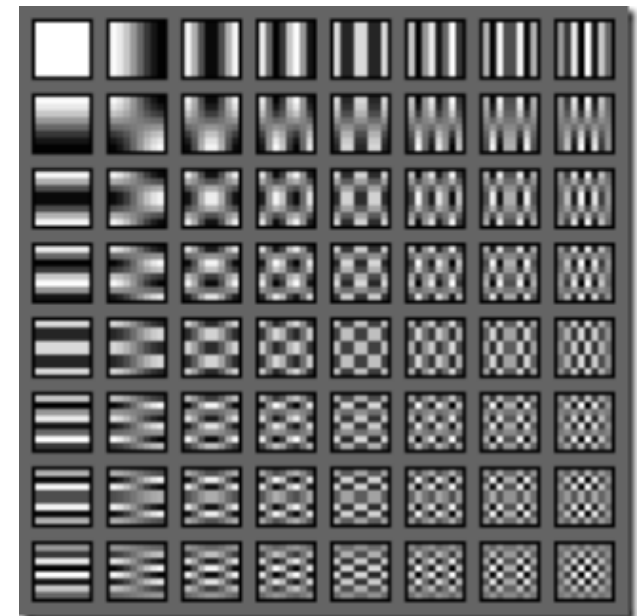
Perfect for photos

original image

lossy JPEG format
with "artifacts"

Any 8x8 pixel region can be represented
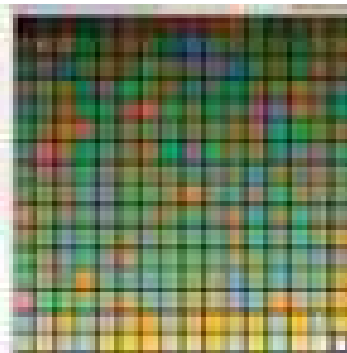as a weighted sum of these patterns

Compressed format - GIF

Graphics Interchange Format

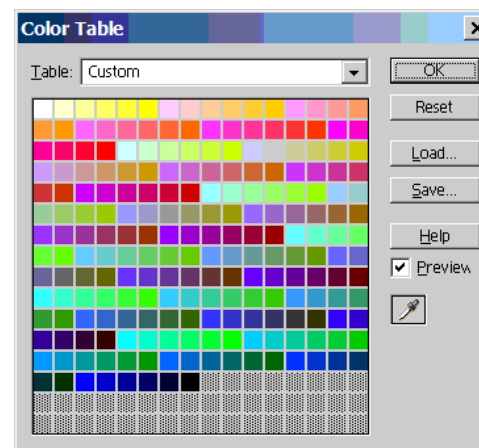Compresses by reducing the number of colors to 256 (8bits per pixel)

then performs normal lossless compression

Bonuses: transparency, animation

Best for drawings, web graphics

Optimized Palette

Web Safe Palette (216 colors)

Compressed format - PNG

Portable Network Graphics

Similar to GIF, but the pallete can have 8,16 or 24 bits (True Color)
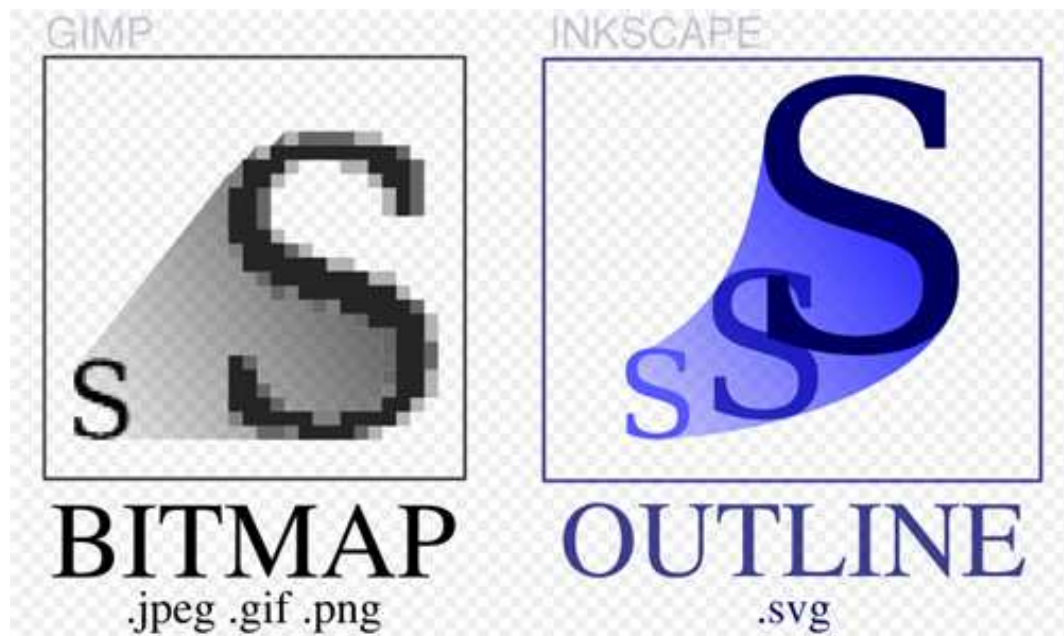
Better lossless compression algorithm

Generally used as a lossless format (i.e. without reducing the color depth).

Vector graphics

Lines stored as mathematical equations („paths") instead of pixels

Resolution independent

Best for text, logos, technical drawings

http://www.teknobites.com/2007/06/30/inkscape-open-source-vector-graphics-tool/

Image editing software

Raster graphics

Photoshop   GIMP   Photopaint / Paint Shop Pro

Vector graphics

Corel Draw   Inkscape