

Web Interface Design (DIW)



Unit 3. Image elements for the web

Web Application Development (DAW)

Ivan Petrus

ppi@paucasesnovescifp.cat

Contents



- Intellectual property
- Image types (Bitmap vs Vector)
- Image formats (BMP, JPG, PNG, TIFF, SVG,...)
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- Image optimization for the web

Intellectual Property



- The set of rights that correspond to the authors and other owners (artists, producers, etc.) with respect to their creations.
- The Intellectual Property Law offers mechanisms that allow to protect the work against moral violations and to receive financial remuneration when the work is used by third parties.
- On April 12, 1996, the revised text of the Individual Property Law was approved by [Royal Legislative Decree 1/1996](#). This consolidated text is subjected to modifications. As an example:
 - [LAW 5/1998](#), 6 of March (legal protection of databases)
 - [LAW 19/2006](#), 5 of June (community regulations)
 - [LAW 23/2006](#), 7 of July (revision of Royal Legislative Decree 1/1996)

Copyright

When we create a website, design its interface and insert graphic resources of our own creation on the page, **we are creating a work that belongs to us** and, therefore, we have inherent rights over it.



What happens if you don't specify a license?

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Author licenses. Creative commons

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	PUBLIC DOMAIN	✓	✗	✓	✓	✓
	CC BY	✓	✓	✓	✓	✓
	CC BY-SA	✓	✓	✓	✓	✗
	CC BY-ND	✓	✓	✓	✗	✗
	CC BY-NC	✓	✓	✗	✓	✓
	CC BY-NC-SA	✓	✓	✗	✓	✗
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Examples of licensed images

Recurso (1)	Datos del recurso (1)	Recurso (2)	Datos del recurso (2)
	Autoría: -= Treviño =-. Licencia: CC BY-NC-SA 2.0. Procedencia: http://www.flickr.com/photos/trevi55/124432417		Autoría: Harshad Sharma. Licencia: CC BY-NC-ND 2.0. Procedencia: http://www.flickr.com/photos/harshadsharma/45345136
	Autoría: -ElFisgon-. Licencia: CC BY-NC-ND 2.0. Procedencia: http://www.flickr.com/photos/salya_yasal/2942806332		Autoría: nateOne. Licencia: CC BY 2.0. Procedencia: http://www.flickr.com/photos/nateOne/3792248755
	Autoría: Galería de MS&T Center for ERP. Licencia: CC BY-NC-ND 2.0. Procedencia: http://www.flickr.com/photos/erpcenter/4568978806/		

[More info](#) (Creative Commons)

Searching images with specific license (Google)

Searching images with specific license (CC)

[Collection of Public Domain Webpages](#)

Class activity 1

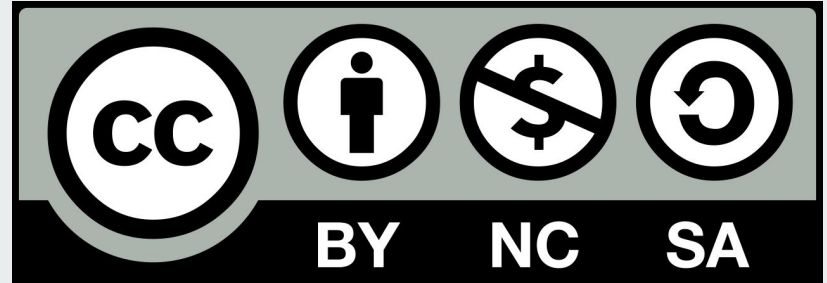
Look for the licenses of at least two of these resources and explain what permissions they provide and what they limit:

- [https://ca.wikipedia.org/wiki/BIOS#/media/Fitxer:Elitegroup_761GX-M754_-_AMIBIOS_\(American_Megatrends\)_in_a_Winbond_W39V040APZ-5491.jpg](https://ca.wikipedia.org/wiki/BIOS#/media/Fitxer:Elitegroup_761GX-M754_-_AMIBIOS_(American_Megatrends)_in_a_Winbond_W39V040APZ-5491.jpg)
- https://ca.wikipedia.org/wiki/BIOS#/media/Fitxer:Award_BIOS_setup_utility.png
- https://ca.wikipedia.org/wiki/BIOS#/media/Fitxer:Trident_TVGA9000.jpg
- <https://ca.wikipedia.org/wiki/Eclipsi#/media/Fitxer:Umbra01-ca.svg>
- https://es.wikipedia.org/wiki/Unidad_de_disco_duro#/media/Archivo:Cilindro_Cabeza_Sector.svg
- https://es.wikipedia.org/wiki/Unidad_de_disco_duro#/media/Archivo:Head_crash.JPG

Class activity 2

You found a photo on the net under a Creative Commons BY-NC-SA license.

- a) Can you use it?
- b) Can you modify and redistribute it?
- c) Can you sell it?
- d) Can you change the license?
- e) Can you omit the author?



Intellectual property management entities



Definition: Organizations engaged in the management of intellectual property (IP) rights. Their activities are regulated by [Royal Legislative Decree 1/1996, of April 12](#)

Types of entities

- Private
- Associative-based
- Non-profit

Functions

Manage the intellectual property rights conferred, subject to current legislation and its statutes.

- Enter into general contracts with associations of users and set general rates for its use.
- Allow the enforcement of compensatory rights (for example, remuneration for private copying).
- Provide assistance and promotion services for authors and performers.
- Protect and defend IP (Intellectual Property) rights against infringements

Intellectual property management entities



There are currently **eight intellectual property rights management entities** authorized by the Ministry of Culture that fall into three groups depending on whether they manage the intellectual property rights of authors, performers or producers:

Authors

- [SGAE](#) (General Society of Authors and Editors)
- [CEDRO](#) (Spanish Center for Reprographic Rights)
- [VEGAP](#) (Visual Plastic Artists Management Entity)
- [DAMA](#) (Audiovisual Media Copyright Association)

Performers

- [AIE](#) (Interpreter Artists or Executants)
- [AISGE](#) (Performers, Management Society)

Producers

- [AGEDI](#) (Intellectual Rights Management Association)
- [EGEDA](#) (Entity for the Management of Rights of Audiovisual Producers)

Content registration



- Is the way to enable **protection** of the IP rights of the authors and other owners
- Is not mandatory but very recommended
- For example, once we have completed our website, we could register it in order to make use of our rights as authors.
- [Where you can register your work](#)
- [Explanation of the General Registry of Intellectual Property regulation.](#)

Working with images



- Image types
- Image formats
- Image properties (size, resolution, ...)
- Filters and effects
- Software to create and process images
- Image optimization for the web

Image Types

Bitmap

A bitmap image is a rectangular grid of pixels, where each pixel's color is specified by a number of bits. A raster is technically characterized by the width and height of the image in pixels and by the number of bits per pixel.



Vector Graphics

Computer graphics images that are defined in terms of points on a Cartesian plane, which are connected by lines and curves to form polygons and other shapes

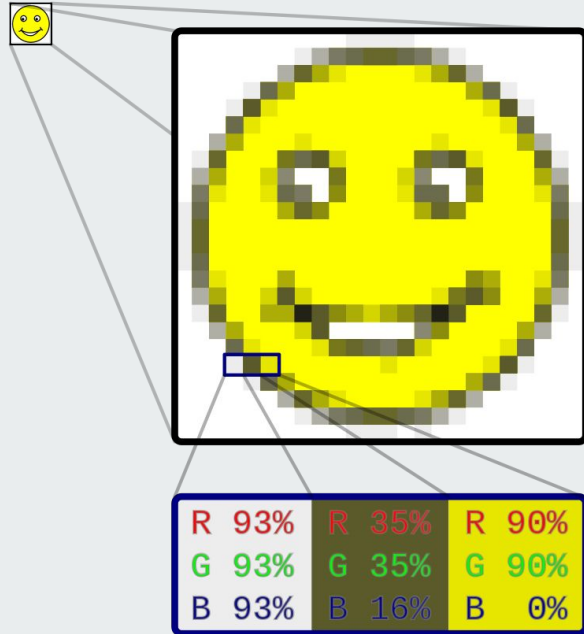


Image Types

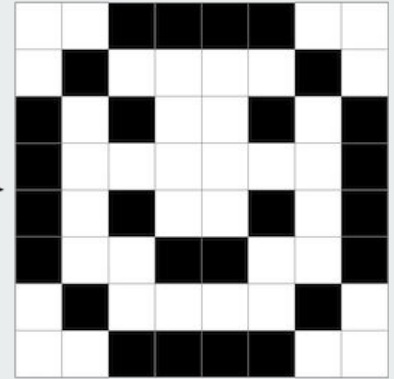


Bitmap	Vector Graphics
Are built with pixels	Are built from mathematical functions that represent geometric objects (polygons , segments, arcs , etc.).
Loose of quality when you zoom in	Not loose of quality when zoomed in
The file size is proportional to the image size.	Image size is independent of file size. It will normally be smaller than bitmaps.
It is used to represent realistic or complex images: photographs, illustrations.	It is used to represent drawings or schemes.

Bitmap viewed as a matrix

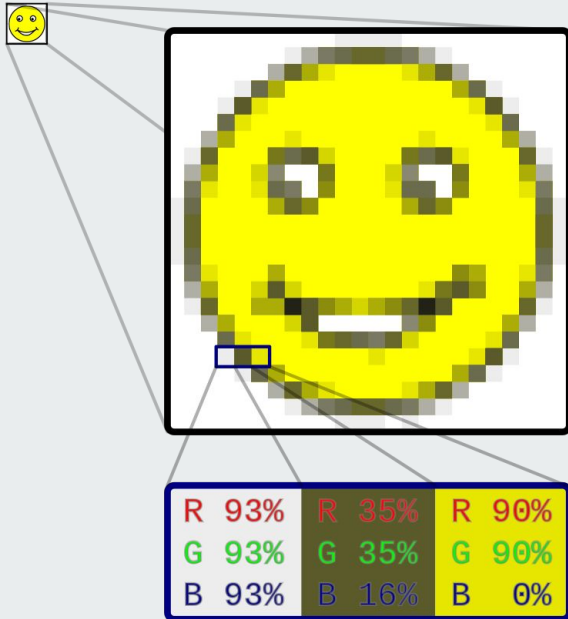


```
1 1 0 0 0 0 1 1
1 0 1 1 1 1 0 1
0 1 0 1 1 0 1 0
0 1 1 1 1 1 1 0
0 1 0 1 1 0 1 0
0 1 1 0 0 1 1 0
1 0 1 1 1 1 0 1
1 1 0 0 0 0 1 1
```



Example

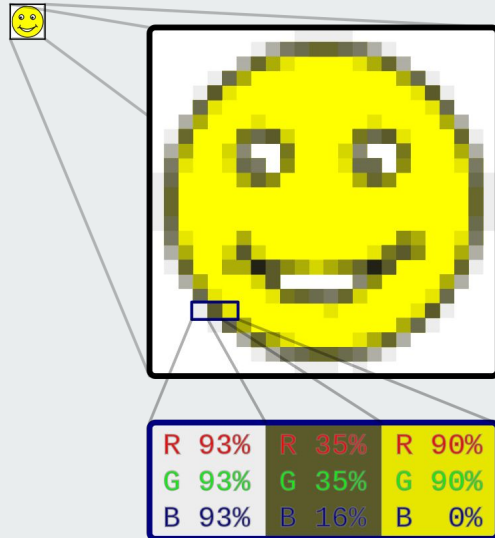
A Pixel of an 8-bit depth image has the 93% value of red channel, which is the decimal representation of that amount?



$$0.93 \times 255 = 237.15 \sim 237$$

Example

A Pixel of an 8-bit depth image has the percentual representation of R=90%, G=90% and B=0%. Which is the decimal representation of that color? which is approximately that color?



$$0.90 \times 255 = 229.5 \sim 230 \text{ (RED)}$$

$$0.90 \times 255 = 230 \text{ (GREEN)}$$

$$0 \times 255 = 0 \text{ (BLUE)}$$

Color = (230, 230, 0)

It's a kind of yellow

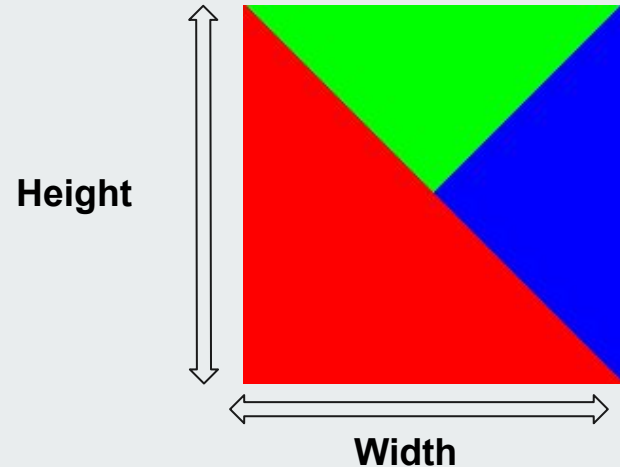
https://www.rapidtables.com/web/color/RGB_Color.html

Example with an RGB image

- Width x Height = 200 x 200 pixels = 40000 total number of pixels
- 8-bit depth x 3 channel : R(8 bit) G (8bit) B (8 bit) → 24 bit / pixel

Could we compute file size with image properties?

**40000 pixels x 24 bit/pixel = 960000 bits =
120000 bytes = 120 kB = 117.19 kiB**



Class activity 3

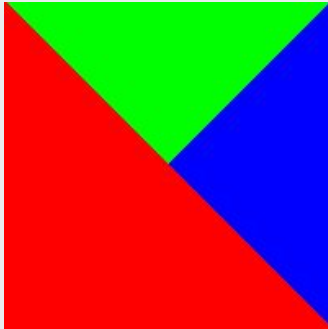


Let's compute the file size of an RGB image with a width of 350 pixel and height of 270 pixels with a 8-bit depth per channel.

- a) How many pixel does the image have?

- b) What is the memory file size in kiB?

Getting deeper information: dedicated programs



To get information about that image, using linux shell commands:

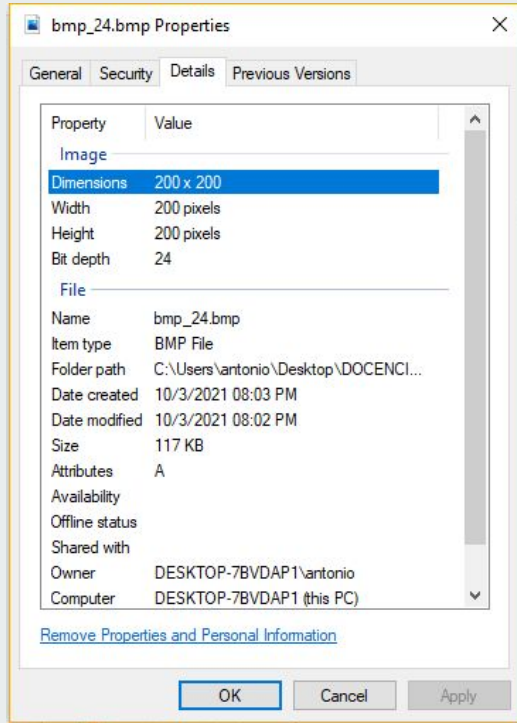
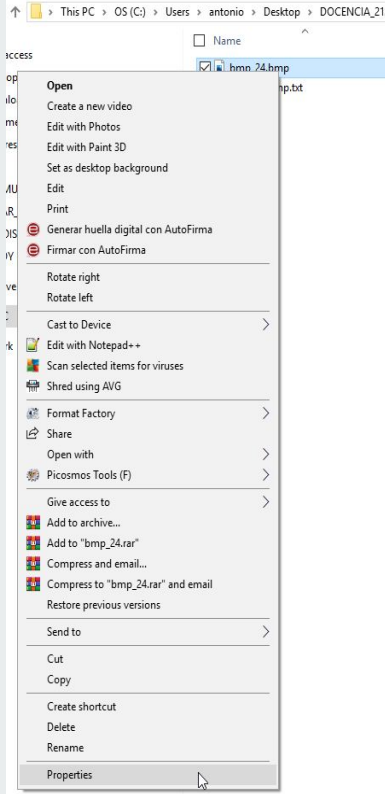
- > hexdump -C bmp_24.bmp | head ([check file headers](#))
- > file bmp_24.bmp
- > identify bmp_24.bmp
- > identify -verbose bmp_24.bmp
- > convert bmp_24.bmp bmp_24.txt (individual pixel information)
- [In powershell](#) → [script](#)

Options to use Linux commands on Windows:

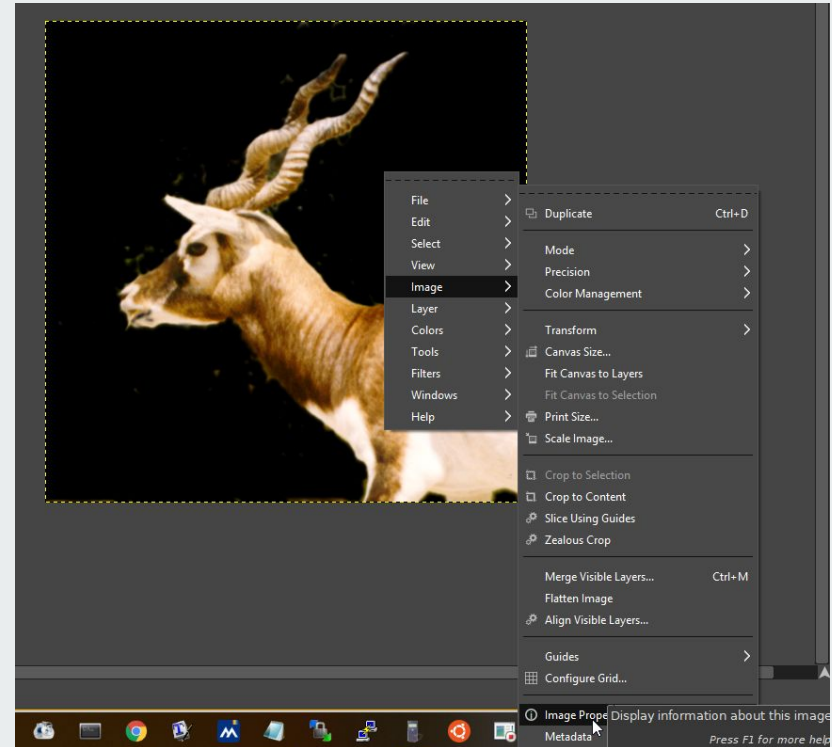
- Download [Cygwin](#) (add bin folder to PATH environment variable)
- [Install the most recent WSL2](#)
- Use a Virtual Machine
- Use a linux on the cloud (for instance, [onworks](#))

Example

From the OS (Windows)



Using external software (GIMP)



Vector graphics



- Vector graphics is a type of computer graphics based on vectors, which lead through locations called control points or nodes. Each of these points has a definite position on the x- and y-axes of the work plane and determines the direction of a path.
- In addition, each path can be assigned various attributes including values such as:
 - stroke color
 - shape
 - curve
 - thickness
 - fill
- Finally, the visual image is created from geometric shapes such as:
 - points
 - lines
 - curves
 - polygons

Vector graphics

SVG Example:

```
<!DOCTYPE html>
<html>
<body>

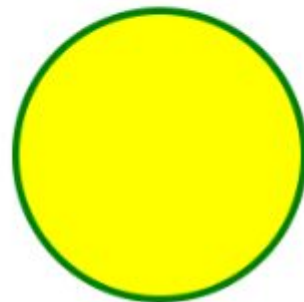
<h1>My first SVG</h1>

<svg width="300" height="300">
  <circle cx="150" cy="150" r="80" stroke="green" stroke-width="4" fill="yellow" />
  Sorry, your browser does not support inline SVG.
</svg>

</body>
</html>
```



My first SVG



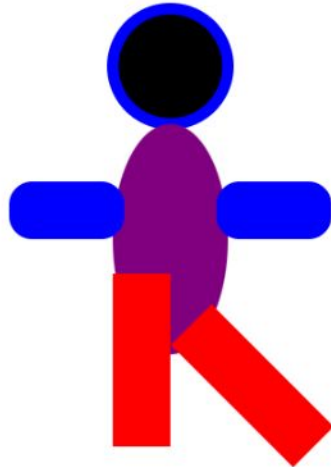
[Library of sample SVG images](#)

Class activity 4

Using the [example](#), let's change the svg code to obtain the following result. Write down the code (useful [link](#))

You can position the vectorial objects directly where you want using transforms like translations and rotations

My second SVG



Class activity 5



Let's try to modify [this file](#) to play with arbitrary images different from the ones that are provided.

- You need to analyze the JS code to know what to modify
- Modify the code to include more images, change the initial location of them and set a different rotation-size change when click are performed over the image.

[Documentation SVG files](#)

Class activity 6



Let's try to modify [this file](#) to get the following changes. Again, analyze the code prior to start the modifications.

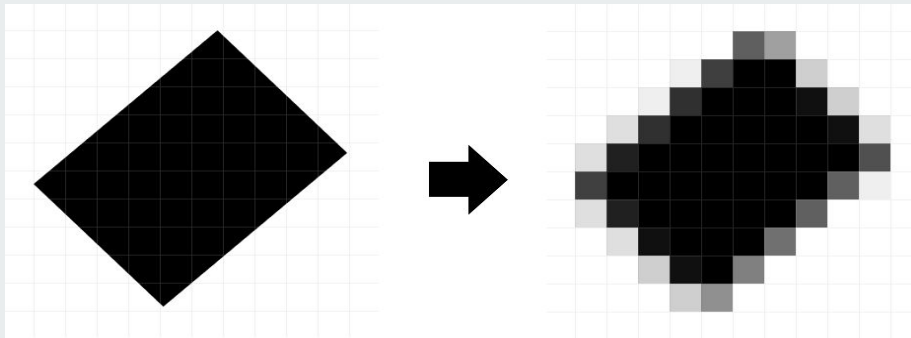
- a) Modify the animation to duplicate the speed of the boxes
- b) Change color boxes to red
- c) Modify the code to change top box direction to vertical (not horizontal)

[Documentation SVG files](#)

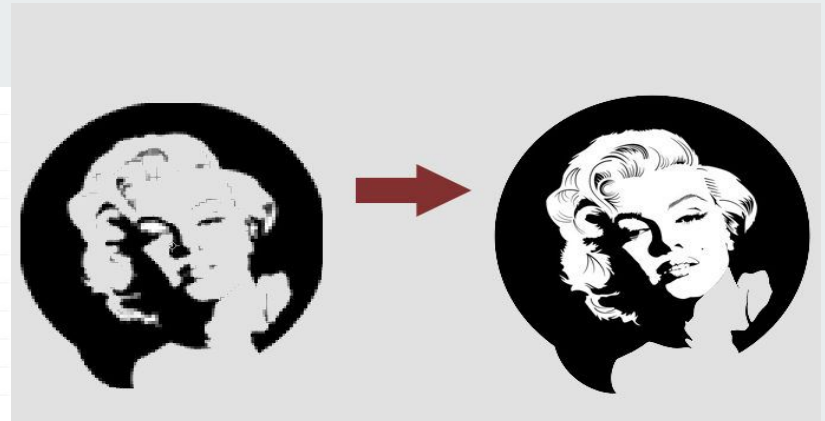
Conversion between vector graphics and bitmaps

Vector images (line work) can be **rasterized** (converted into pixels), and raster images **vectorized** (raster images converted into vector graphics), by software. In both cases some information is lost, although certain vectorization operations can recreate salient information, as in the case of **optical character recognition**.

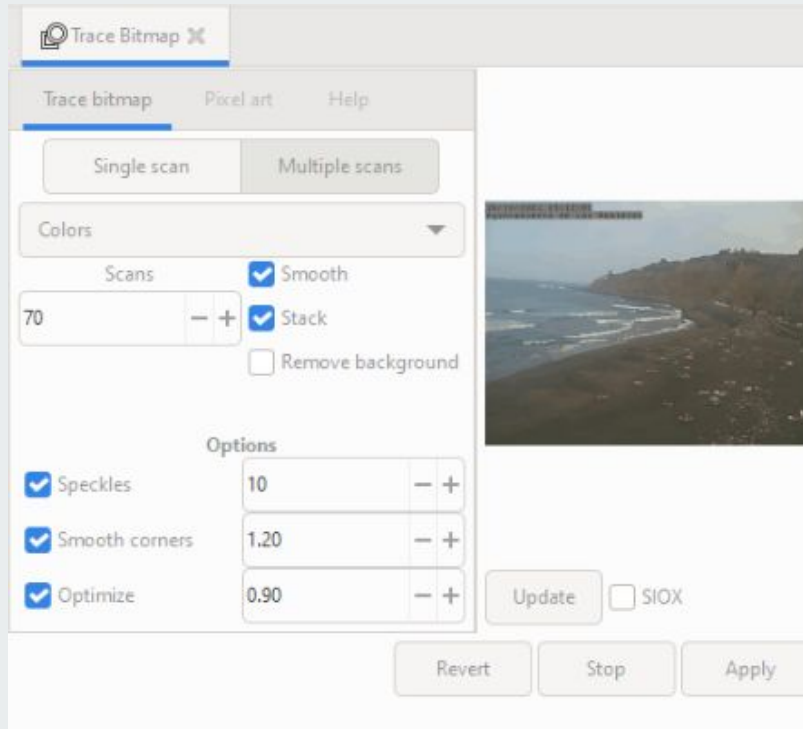
Rasterization



Vectorization (or *Tracing*)



Vectorization example



[Vectorization \(Tracing a bitmap\)](#)
(tutorial)

Vectorization example

Bitmap (35 kb)



Vectorized (2.35 Mb)



Class activity 7

Let's vectorize [this image](#) using Trace Bitmap function in Inkscape:

- Download and install [Inkscape](#)
- Open downloaded image
- Vectorize the image:
 - ALT+SHIFT+b
 - Apply optimal parameters. Find a compromise between size-quality
- Check the output file size. How much has it changed? (write in terms of % respect original file size)

Bitmap images. Formats.

When talking about image formats on the Web, traditionally have been considered the bitmap images, that can be identified through their extensions, being the formats GIF, JPG, PNG and WEBP the most used.

- Images can be introduced in HTML code by using `` tag. The location path of the image must be specified by `src` parameter, and alternative text (`alt`) to be displayed when image cannot be rendered in a browser.
- ``

Bitmap images. Formats. GIF



GIF (Graphics Interchange Format):

- The format **supports up to 8 bits per pixel for each color**, but allowing a single image to reference its own palette of up to 256 different colors in RGB.
- It supports animations.
- These palette limitations make the GIF format less suitable for reproducing color photographs and other images with continuous color, but **it is well suited for simpler images** such as graphics or logos with solid areas.
- GIF images are compressed using the Lempel–Ziv–Welch (LZW) **lossless** data compression technique to reduce the file size without degrading the visual quality.
- It also allows transparent colors without any graduation (as PNG).

A [repository](#) for GIF files

Class activity 8

Download the [following GIF](#) and answer these questions. Almost all the answers can be found using [GIMP](#)



- How many frames are in the following image?
- What is the total time of the scene?
- What is the average FPS?
- What is the resolution?
- What is the physical and memory size?
- Look for a conversion command to reduce the speed by two.

Bitmap images. Formats. JPEG



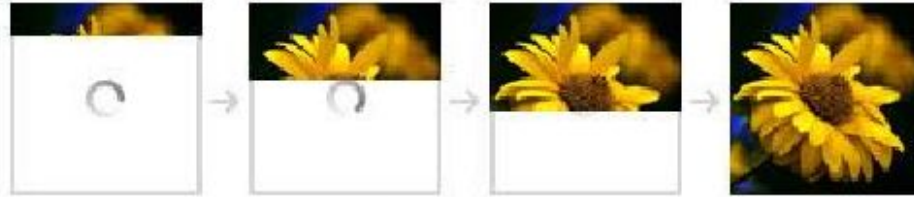
JPEG (Joint Photographic Experts Group):

Was designed for the compression of photographic images, based on the fact that the human eye is not perfect and is not able to capture all the information that you can store in a 24-bit image.

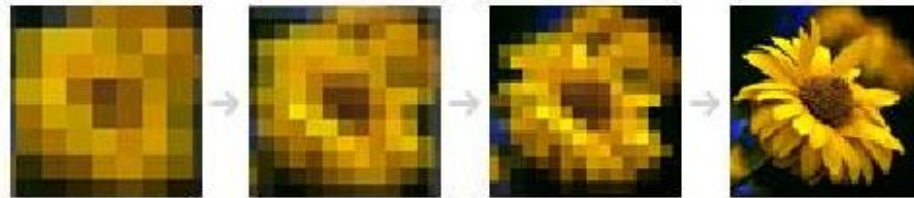
- **Method of lossy compression for digital images**, particularly for those images produced by digital photography.
- **The degree of compression can be adjusted**, allowing a reasonable tradeoff between storage size and image quality.
- **This compression can reduce the image fidelity**, so it should not be used where the exact reproduction of the data is required (such as some scientific and medical imaging applications)
- There is also an interlaced **progressive JPEG format**, in which data is compressed in multiple steps of progressively higher detail. This is ideal for **large images** that will be displayed while downloading over a slow connection, allowing a reasonable preview after receiving only a portion of the data.

Bitmap images. Formats. JPEG

Interlaced images



Baseline JPEG

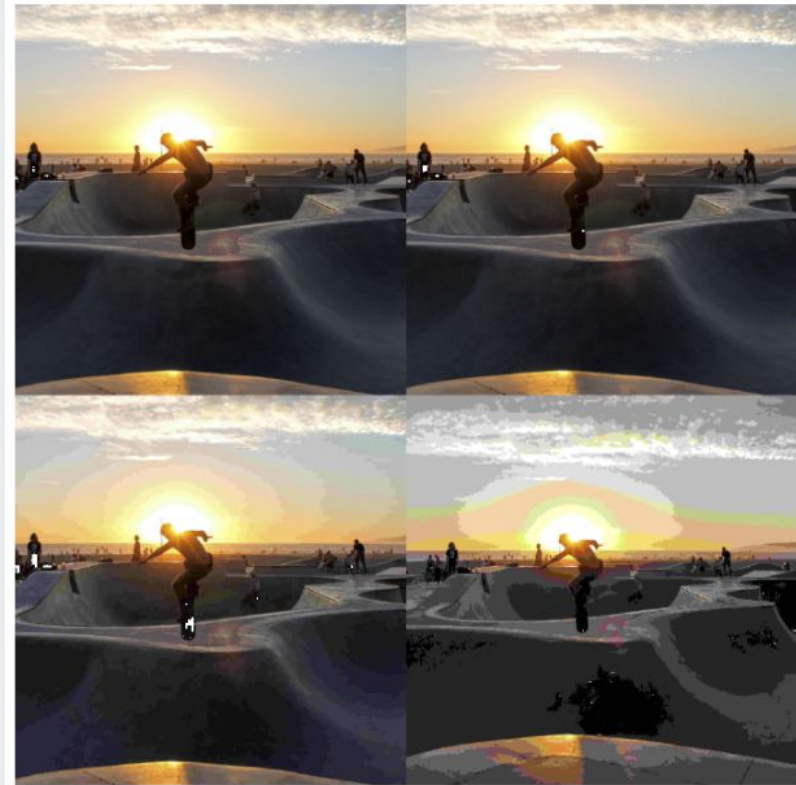


Progressive JPEG

Bitmap images. Formats. JPEG

JPEG compression quality levels

- Original image (100% of quality) : Top left
- Compressed image (50%) : Top right
- Compressed image (10%) : Bottom left
- Compressed image (1%) : Bottom right



Bitmap images. Formats. PNG

PNG (Portable Network Graphics):

Is the most suitable for uniform color images (a few different colors and lot of pixels being the same color).

- Compression without loss (lossless).
- It supports:
 - palette-based images (of 24-bit RGB or 32 RGBA colors).
 - grayscale images (with or without [alpha channel](#)).
 - full-color non-palette based RGB[A] images (with or without alpha channel).
- It offers a **variety of transparency options**. With true-color and grayscale images either a single pixel value can be declared as transparent or an alpha channel can be added (enabling any percentage of partial transparency to be used)

Bitmap images. Formats. WebP



WebP

- Developed by Google (announced in September, 2010)
- Produce images with a lower size and the same quality
- Allow animation of images with 24 bits
- Supports the alpha channel
- Supports both lossy and lossless compression.
- Supported by 94% of browsers (May, 2021)
- Graphic design software does not normally include the option to export in this format natively, and plugins must be used from third parties to add this option.

Bitmap images. Other formats



If you use a linux shell try:
> file -I

Other common file formats that are used as bitmap data are the following:

- BMP: an outdated and limited file format that is not suitable for use in edition.
- EPS: a flexible file format that can contain both bitmap and vector data. It is gradually being replaced by PDF.
- PDF: versatile file format that can contain just about any type of data including complete pages, it is not yet widely used to exchange just images
- PICT: a file format that can contain both bitmap and vector data but that is mainly used on Macintosh computers and is not very suitable for prepress.
- TIFF: a popular and versatile bitmap file format
- PSD: the native file format of Adobe Photoshop (which can also contain vector data)

More file formats for images and other multimedia resources.
A comparison between bitmap formats is available [here](#)

Vector graphics. Formats



- The most popular standard of vector image formats are:
 - [.eps](#) (postscript file), [.ps](#), .pdf, (maybe containing both pixel and vector data)
 - .fla and [.swf](#) (defined by Adobe)
 - [.wmf](#) (defined by Microsoft Windows)
 - [.svg](#) (defined by the W3C).

Vector graphics. Formats. SVG



- Scalable Vector Graphics (SVG) is an XML-based vector image format for two-dimensional graphics with **support for interactivity and animation** (Javascript and CSS). The SVG specification is an open standard developed by the W3C. It **allows transparency and lossless compression** by gzip.
- SVG images and their behaviours are defined in XML text files. This means that they can be searched, indexed, scripted, and compressed. SVG images can be created and edited with any text editor, but are more often created with drawing software (for instance Inkscape). Can be introduced in a website by using <svg> tag in HTML code or be saved as separated file with *.svg extension.
- All major browsers (including Mozilla Firefox, Internet Explorer, Google Chrome, Opera, Safari and Microsoft Edge) have at least some degree of SVG rendering support.
- SVG allows three types of graphic objects: vector graphics, raster graphics, and text.

Vector graphics. Formats. SVG examples



With SVG you can obtain from a simple design to a very detailed image. It depends on how many polygons you use. As much detail, much final file size!!

Check some of these examples:

- [Library of sample SVG images](#)
- [Animated and interactive example](#)
- [Animation](#)
- [Car](#)
- [Alpha](#)

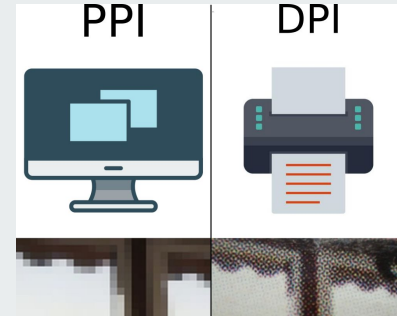
Size and Resolution

- **PPI (Pixels Per Inch)** refers to the display resolution, or, how many individual pixels are displayed in one inch of a digital image :

1 inch = 1" = 2.54 cm

PPI = Diagonal Resolution / Diagonal Size

- **DPI (Dots Per Inch)** refers to printer resolution, or the number of dots of ink on a printed image.
- **Physical Size:** The physical size of an image refers to the dimensions in which it would print (ex: 8.5" x 11") or the pixels dimensions of an image displayed on the web (ex: 600 pixels x 800 pixels).
- **Memory Size:** The memory size is how much memory an image file takes up on a computer. It will be decompressed and depends on dimensions, bit depth, compression, metadata, alpha-channels, layers and file format (among other things).



Class activity 8



An image of 2000 x 1400 pixels is printed at 300 dpi. What is the physical size of the image in cm?

$$\text{Height} : 2000\text{pix} \cdot \frac{1\text{inch}}{300\text{pix}} \cdot \frac{2.54\text{cm}}{1\text{inch}} = 16.93\text{cm}$$

Width ? 11.8 cm (118 mm)

Class activity 9

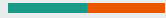


An image of 230 x 420 pixels is displayed at 72 ppi on the laptop screen.

- a) What is the physical size of the image in cm?
- b) What is the resolution of your laptop screen?
- c) What is the diagonal length in cm of your screen? and in inches?
- d) Then, how many ppi is using that image?

[You can check here some models](#)

Color Models → abstract mathematical model describing the way colors can be numerically represented



RGB → Additive color (such in a screen computer)

Red → (255,0,0)

+

Blue → (0,0,255)

=

Magenta → (255, 0, 255)

Green → (0,255,0)

+

Blue → (0,0,255)

=

Cyan → (0,255,255)

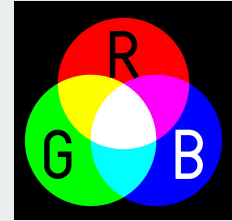
Red (255,0,0)

+

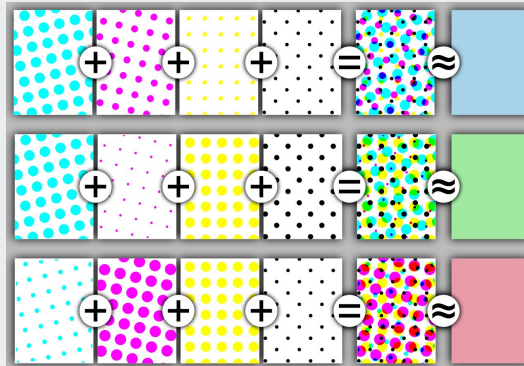
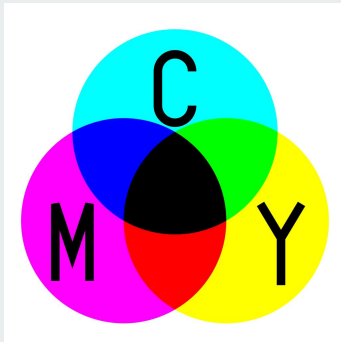
Green → (0,255,0)

=

Yellow → (255, 255, 0)

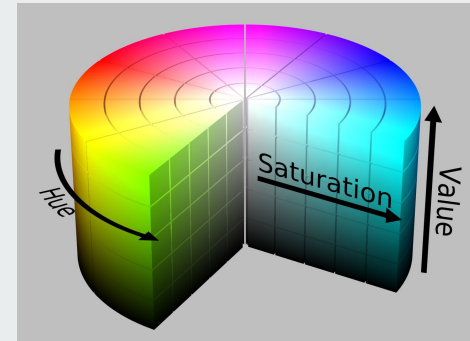


CMYK → Subtractive color (such in ink cartridges)



HSV (Hue-Saturation-Value)

Based on color perception ([Expl](#))



Color Spaces

→ specific implementation of a color model, that takes into account device limitations
RGB color model has 2 main representations: sRGB and AdobeRGB.

We can change the color space used in our images

imagemagick values : rgb, cmyk, gray, lab, hsv, hsl, YCbCr, YUV,...

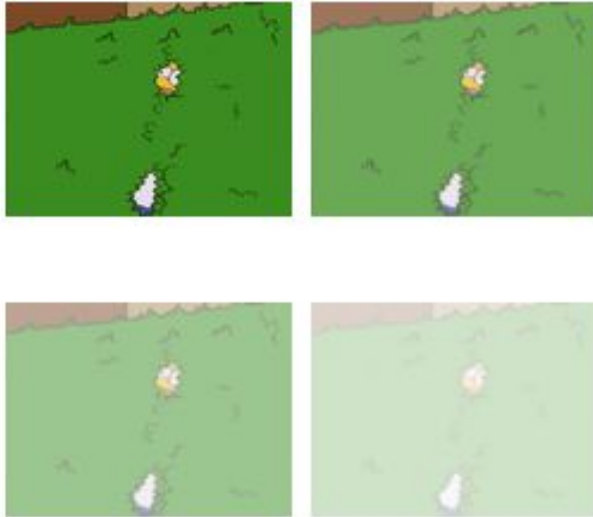
Examples

- RGB to CMYK → convert HOMER-4.jpg -colorspace cmyk HOMER-4-cmyk.jpg
- RGB to Gray → convert HOMER-4.jpg -colorspace gray HOMER-4-gray.jpg



Alpha Channel (Transparency)

convert HOMER-23.png -alpha set -background none -channel A -evaluate multiply 0.75 +channel result75.png
convert HOMER-23.png -alpha set -background none -channel A -evaluate multiply 0.5 +channel result.png
convert HOMER-23.png -alpha set -background none -channel A -evaluate multiply 0.25 +channel result25.png
montage HOMER-23.png result75.png result.png result25.png mont.png



Using GIMP

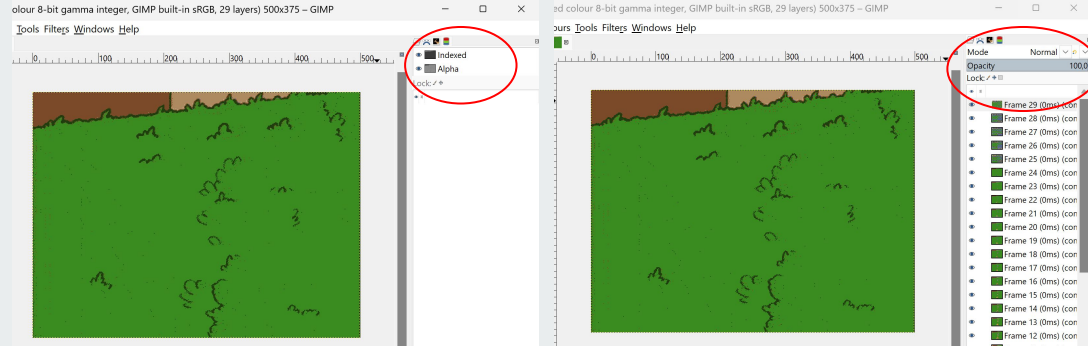


Image properties summary



-  Type
 - Bitmap
 - Vector Graphics
- Formats (JPG, PNG, SVG, PDF,...)
- Bit depth (8-bit) - Number of colors
- Physical size (H x W)
- Memory Size (Mib, kib, kb, Mb,...)
- Resolution (screen - ppi, printed - dpi)
- Color Space (RGB, CMYK, HSV / HSL,...)
- Transparency - Alpha Channel
- Compression - Algorithm / with loss or lossless
- Can support animations?

Image Optimization for the Web



- ▶ Why? We need to decrease web page size and improve loading speed
- ▶ The weight of a image file is mainly determined by:
 - ▶ Size of the image (number of pixels)
 - ▶ Depth (bits per channel)
 - ▶ File format (jpg, gif, png, webp, ...)
 - ▶ Colour palette: full range of colours that can be used in a illustration program or that can be displayed on a device screen. The more colours, the more bits are needed.

Image Optimization → Recommended tips

- 
- ▶ Reduce the number of requests
 - ▶ Remove Exif/IPTC or other metadata will reduce the weight but could affect SEO
 - ▶ 72-96 should be a good value for ppi (300 dpi for printing)
 - ▶ Reduce the number of colours in the palette
 - ▶ Work with uncompressed files (BMP, TIFF or JPEG) and export them to the desired and optimized format
 - ▶ Formats and image usage (printing, view in large screen, just for thumbnails) :

GIF: for drawings, graphics and logos. With solid colours and small palette

JPEG: photographs and complex gradients. Use 24 bits of colour and a proper compression (60-80%). Check the quality of the image. Lossy compression can create artifacts (distortions).

PNG: images with plain colours and simple shapes

WebP: a modern and complete solution but maybe not full supported by all browsers

- ▶ Find a compromise between quality, size and image objective.
- ▶ Simple shapes and colours produces lighter files.

Image Optimization → Advanced tips



- ▶ Use Media Queries to adapt the site depending on the device parameters
- ▶ [Interlaced](#) GIF and JPEG (the image loads progressively)
- ▶ Consider using [sprite-sheets](#)
- ▶ Special font libraries of vectorial images ([Font Awesome](#) or [Bootstrap Glyphicons](#)). Both have tutorials on W3Schools
- ▶ Responsive design: layout and content change based on device characteristics.
- ▶ Responsive images: changing proportions, cropping or replacing the image.

Image Optimization → Advanced tips

- ▶ `` tag:
 - ▶ Use proportional size (relative to image container)
 - ▶ [srcset attribute](#): multiple image files for different device characteristics ([try zooming this example](#))
- ▶ [<picture> tag](#): gives more flexibility for images in responsive designs.

Caution!

- ▶ Using JavaScript will delay image loading. Use it only when needed!
- ▶ Inline images with DataURI: you can include a file (an image or whatever) as a [Base64](#) encoded string.
 - ▶ This will increase the page size
 - ▶ This will produce more complex code

Favicons



- ▶ A favicon is a small square icon used as branding for a website.
- ▶ It helps users to locate the page easier when there are multiple tabs opened.
- ▶ Best designs are small images or 1 to 3 characters.
- ▶ Should contain original logo company or a part of it.
- ▶ It's visible on tabs, bookmarks, toolbar, history and search bar.
- ▶ They add legitimacy to the site and helps online branding.
- ▶ Recommendations for creating a favicon:
 - Start with an square image
 - Use space wisely, a smaller version of the logo is better
 - Keep the design as simple as possible. Too much detail will make it look messy.
 - Keep brand identity, it tells users what the business is about

Favicons. Which size to use?

Caution: the browser resizes favicons to fit in the tab space. Use them wisely.

Size	Name	Purpose
32×32	favicon-32.png	Standard for most desktop browsers
128×128	favicon-128.png	Chrome Web Store icon & Small Windows 8 Star Screen Icon*
180×180	favicon-180.png	iOS preferred
192×192	favicon-192.png	Google Developer Web App Manifest Recommendation

<https://www.emergeinteractive.com/insights/detail/the-essentials-of-favicons/>

Favicons: file format options

► There are different file format options for favicon images:

- Windows ICO (widely supported)
- PNG
- SVG (not a good support)
- GIF
- JPG

● Examples



Adding a favicon to your webpage

put your little picture in the tab bar

Create the design in **Inkscape** (vector graphics application).

Export as a **16×16 pixel PNG file**.

Open in **Gimp**, and save as "**Microsoft Windows icon**", with the name **favicon.ico** and details "**32bpp, 8-bit alpha, no palette**".

Upload **favicon.ico** to the root directory of your website.

Make sure the **MIME type** for **.ico** files is set to "**image/x-icon**".

- ▶ Adapt the MIME depending on the file type
 - ICO: type="image/x-icon"
 - PNG: type="image/png"
 - GIF: type="image/gif"
 - JPEG: type="image/jpeg"

- ▶ Insert in the HEAD section of your HTML:
 - <link rel="icon" sizes="128x128" href="icon-128.png">

Generation of .ico favicons (multiple sizes)



A .ico file can embed multiple sizes in a single file

Using GIMP you can create a multi-size favicon file:

- Open your image in Gimp
- Make your canvas square
- Resize your layer to the image
- Scale the layer to the largest size in your .ico file like 64 pixels
- Duplicate the layer
- Scale the duplicate layer to the next size
- Keep duplicating / scaling for all the sizes you want in your .ico file
- Save as .ico

Using Imagemagick you can convert your design to a .ico file with multiple sizes:

```
> convert logo.png -define icon:auto-resize=32,128,180,192 favicon.ico
```

Check it:

- file favicon.ico
- identify favicon.ico