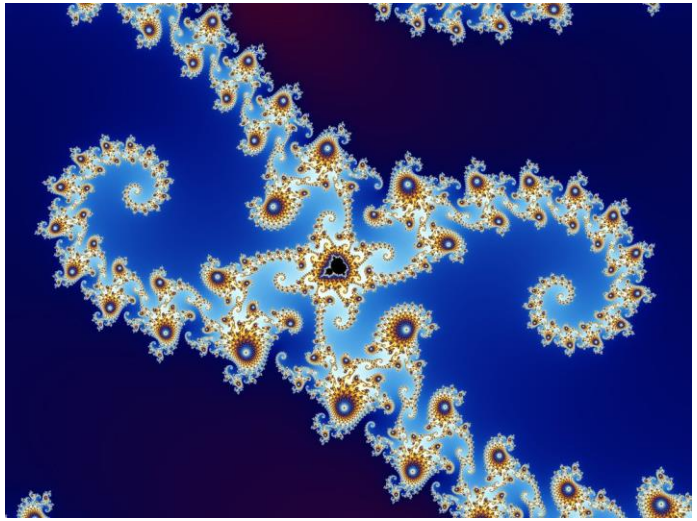
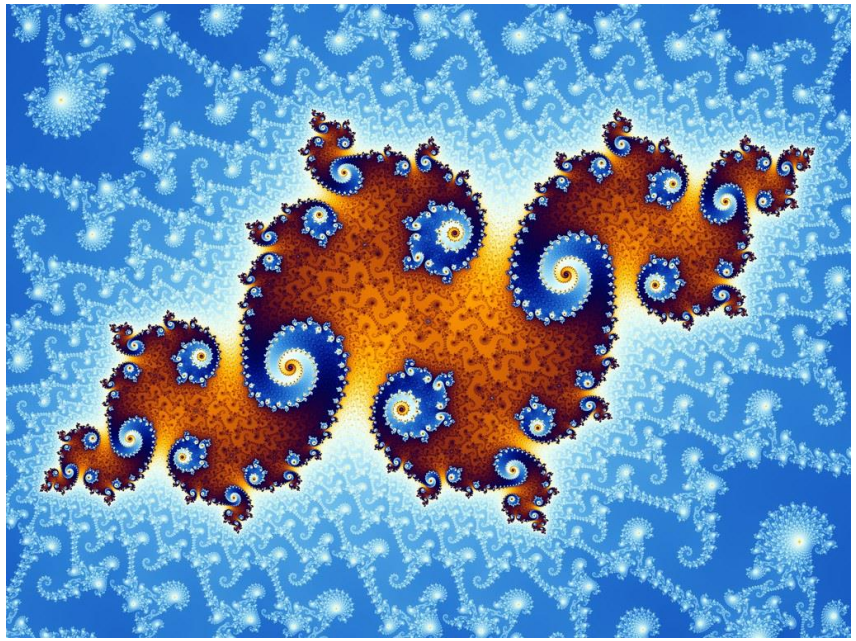
Python crash course

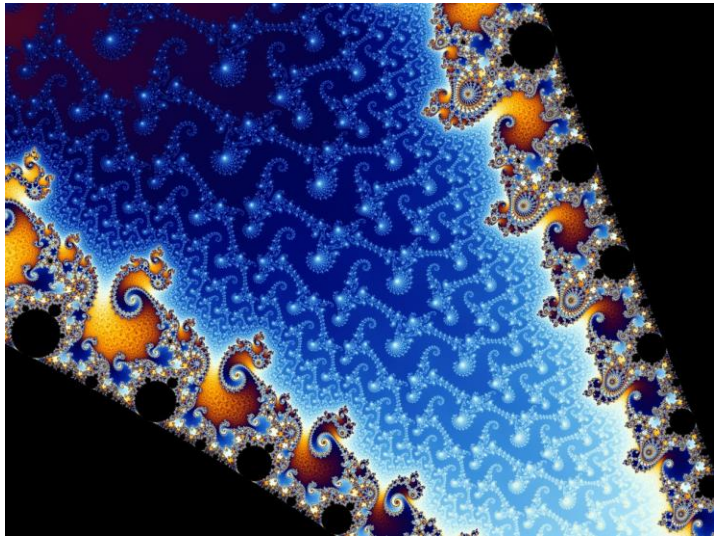
Cool stuff you will learn / be able to programme

Mandelbrot set – create art in python

- One equation: $z_{n+1} = z_n^2 + c$
- 10 lines of code
- https://en.wikipedia.org/wiki/Mandelbrot_set

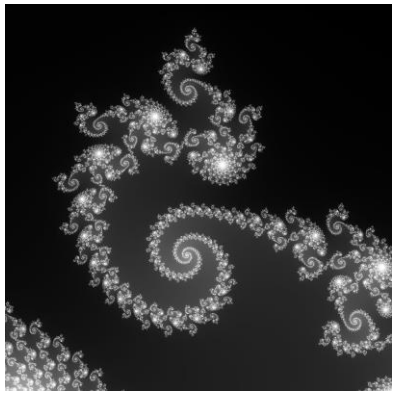


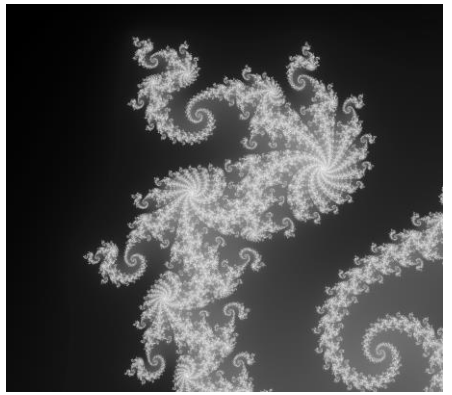


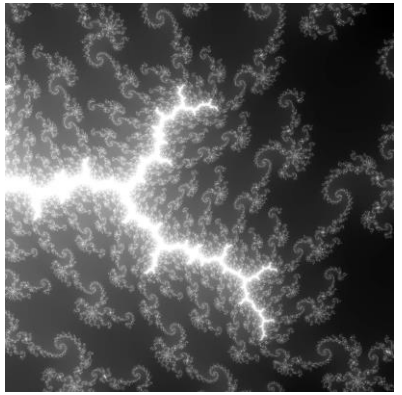


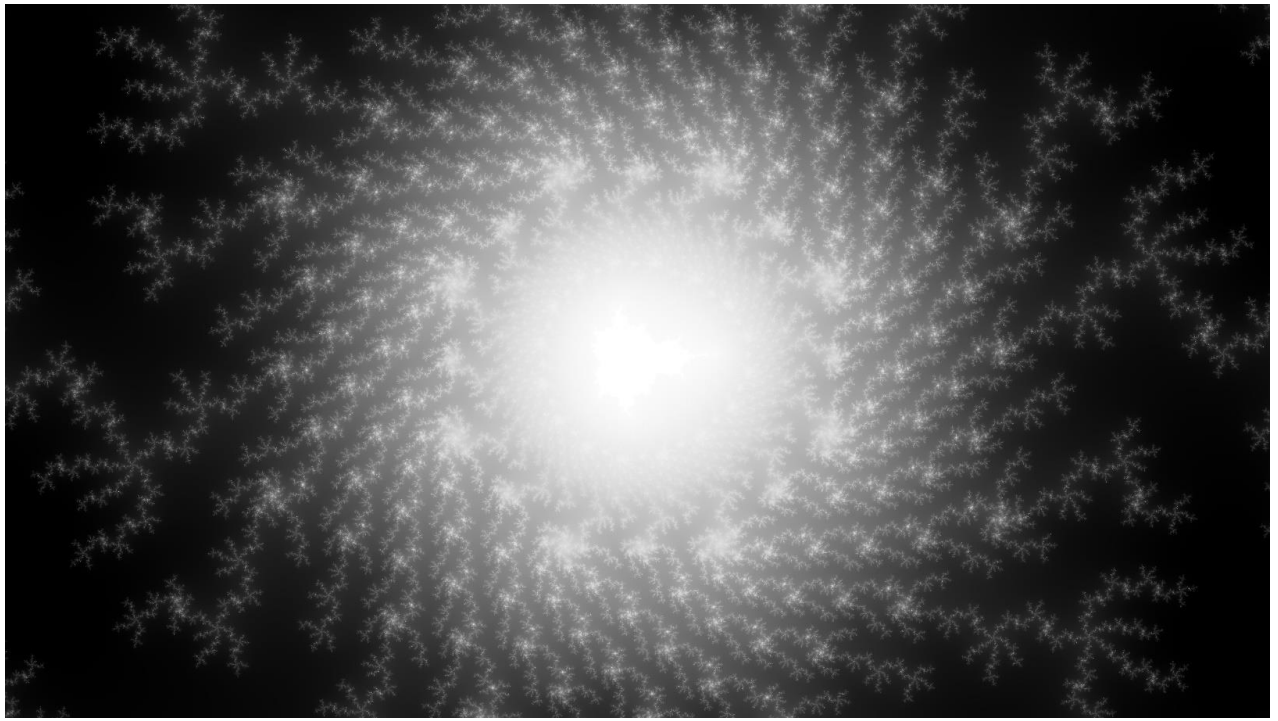
Mandelbrot set – create art in python

```python
def iterations_in_mandelbrot_set(c, z, max_iter):
    for i in range(max_iter):
        z = z**2 + c
        if abs(z) > 2:
            return i
    return max_iter
```









Web scraping

- Scraping IMDb, Wikipedia etc. to get images, descriptions, actors … from movie file names.
- Can recommend this movie

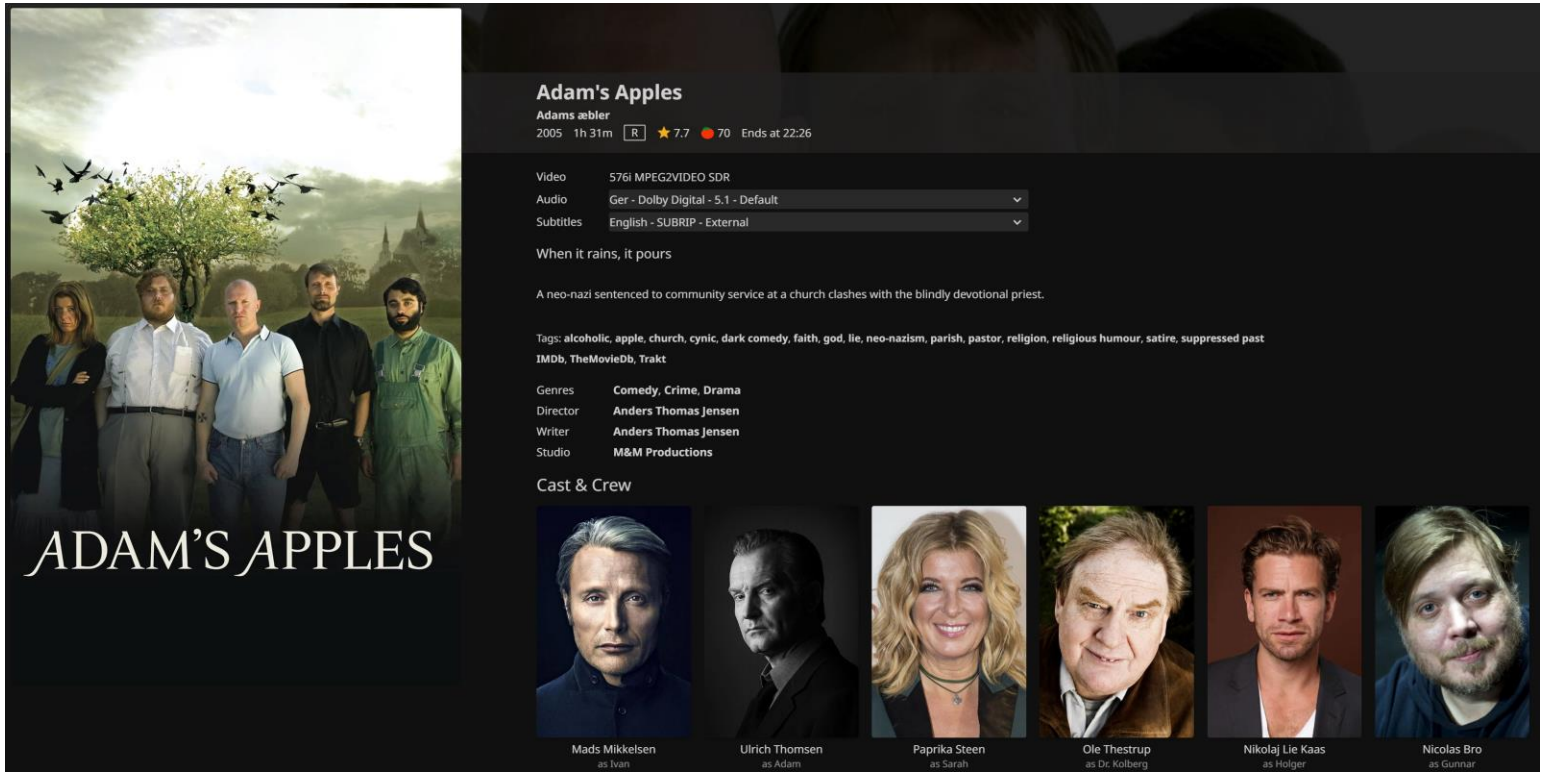


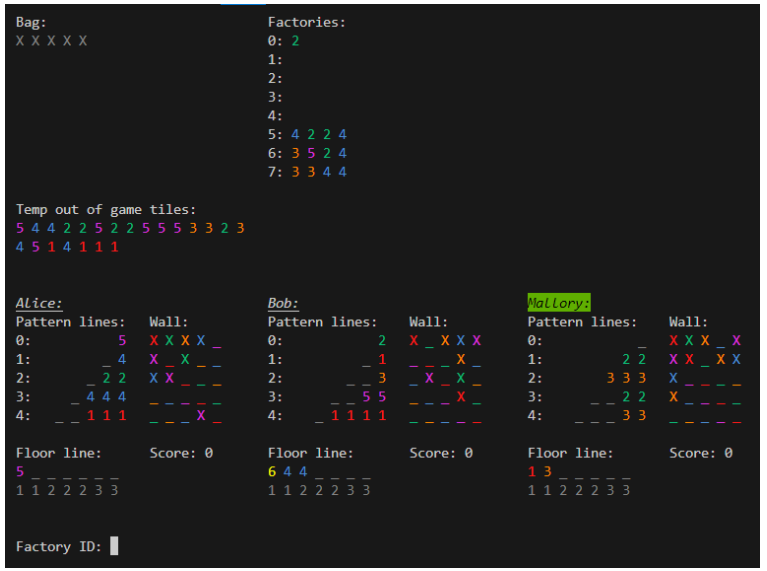
Image processing

- Make for the human eye invisible things visible
- Some stones moved slightly due to a person walking over them
- With simple image processing, the difference can be made visible
- Source: https://youtu.be/NSS6yAMZF78
- Really cool, relaxing video!
- Check it out.
- Seriously!

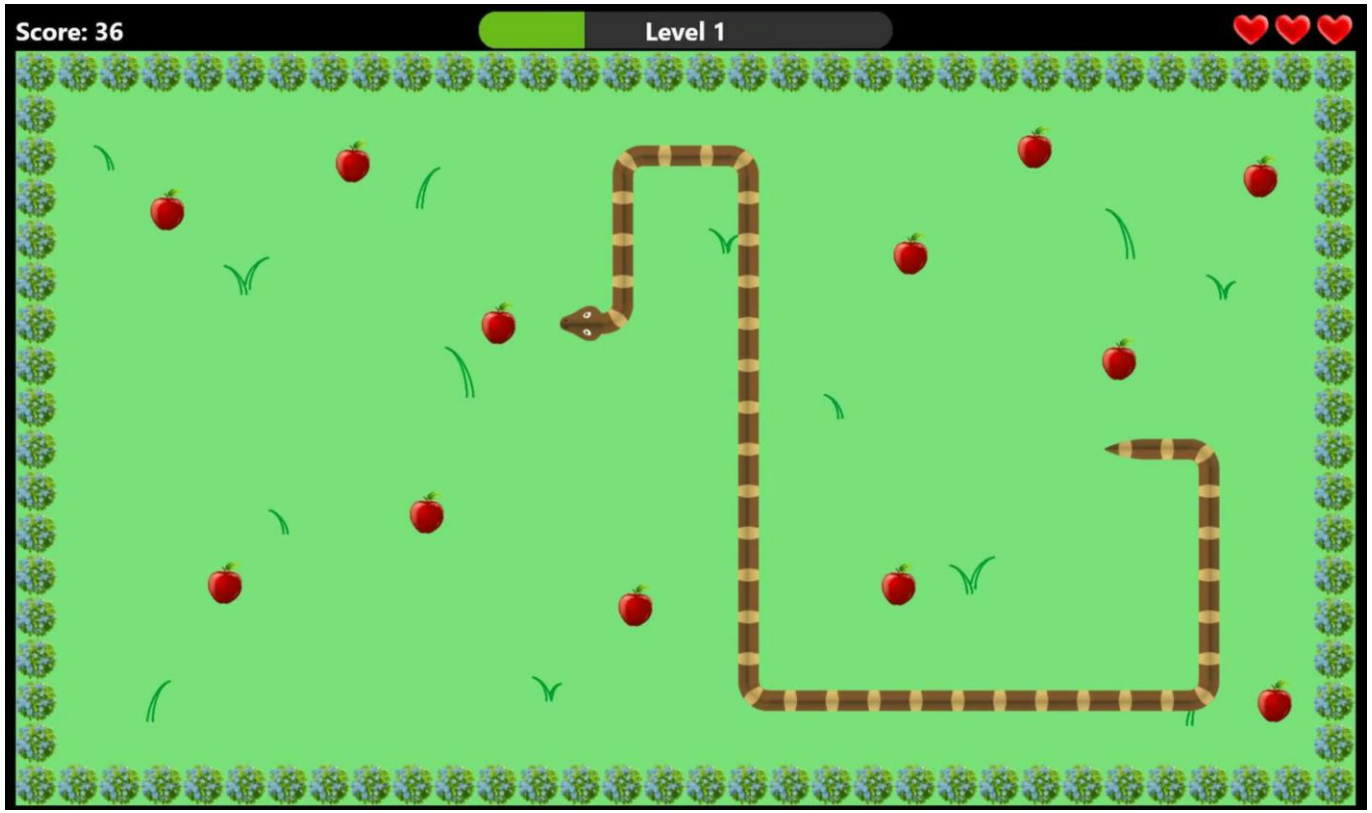
Video screenshots

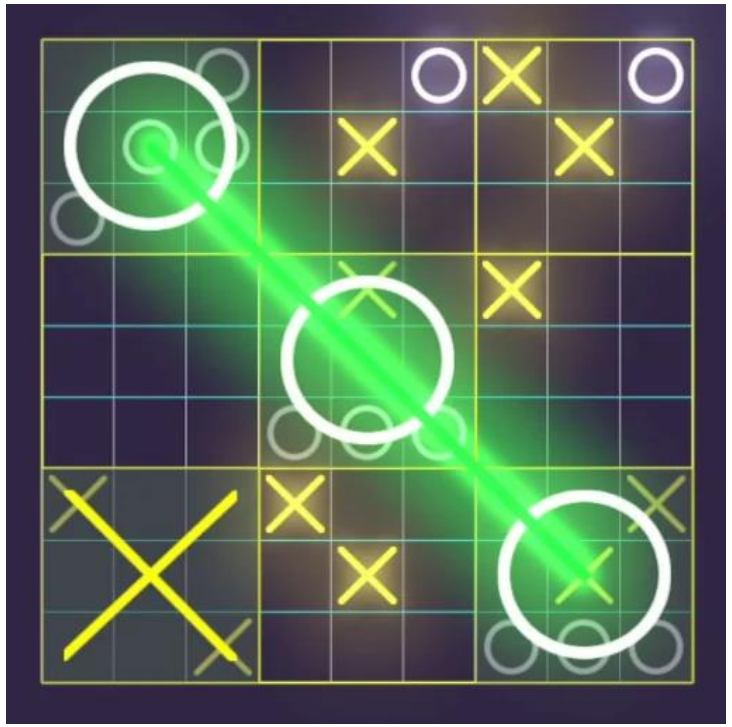
Machine learning - train your own neural network

- Train an AI bot which becomes better than you in your favorite board game!
- Can recommend this board game
- Play my python implementation right now: https://github.com/StraightCurlyCurves/azul



Programme a game like Snake or Tic Tac Toe





Steganography – hiding an image within an image

8-bit image

		Decimal	*Binary*
Pixel of public image		R: 255 G: 0 B: 255	1111 1111 0000 0000 1111 1111
Pixel of private image		R: 0 G: 255 B: 255	0000 0000 1111 1111 1111 1111

MSB

LSB

16-bit image

	Decimal	*Binary*
	R: 65280 G: 0 B: 65280	1111 1111 0000 0000 0000 0000 0000 0000 1111 1111 0000 0000
	R: 0 G: 255 B: 255	0000 0000 0000 0000 0000 0000 1111 1111 0000 0000 1111 1111

Add both pictures together

	Decimal	*Binary*
	R: 65280 G: 255 B: 65535	1111 1111 0000 0000 0000 0000 1111 1111 1111 1111 1111 1111

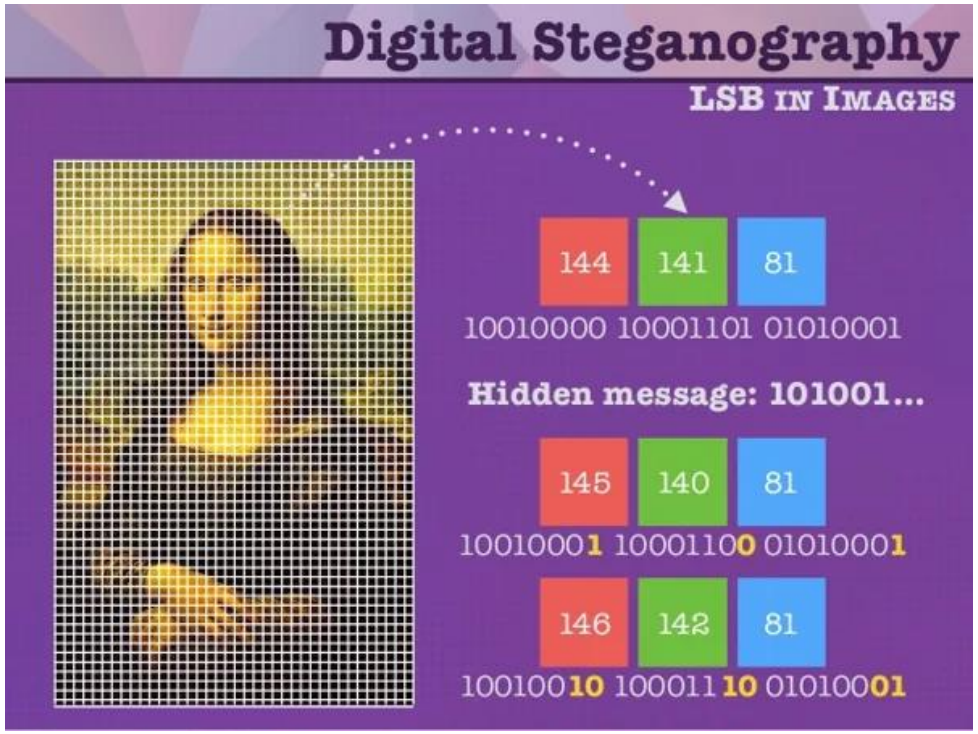
What we see:

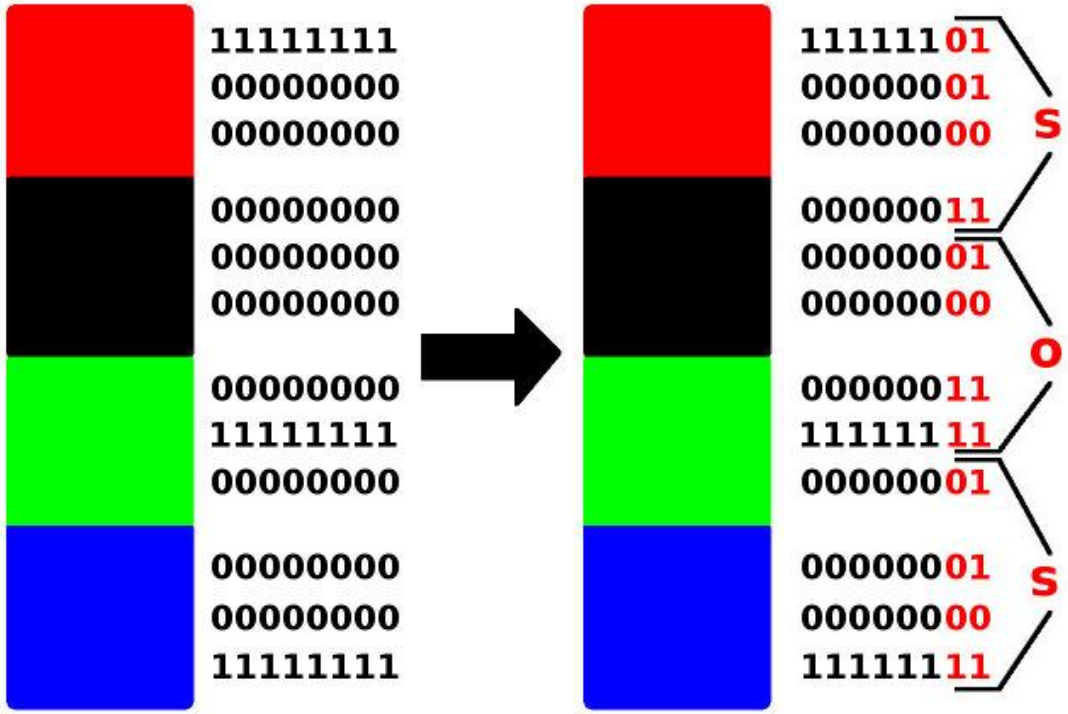
R: 254
G: 1
B: 255

For a human eye indistinguishable

Vincent van Gogh is hidden in Mona Lisa!

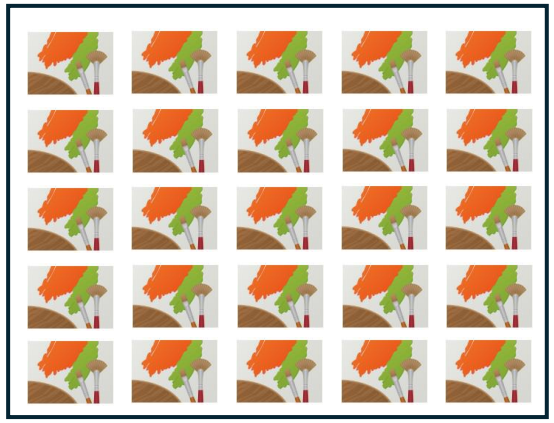
Steganography – hiding text in an image



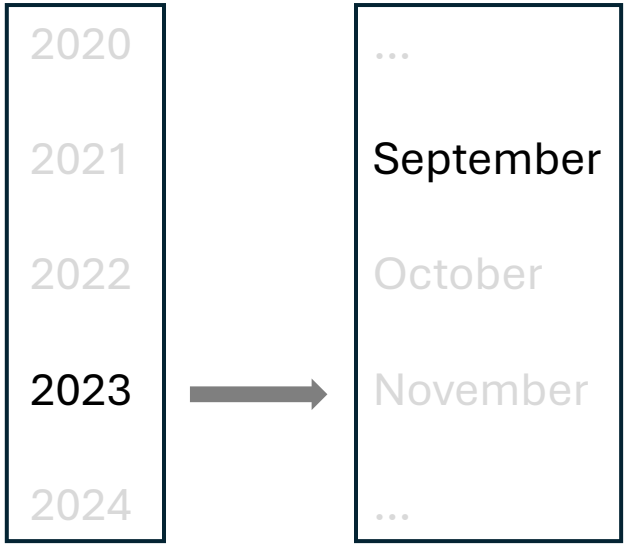


File Management

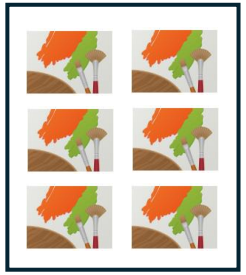
Image folder



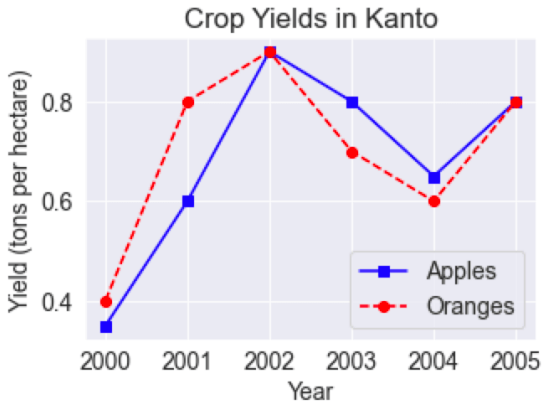
Folder structure

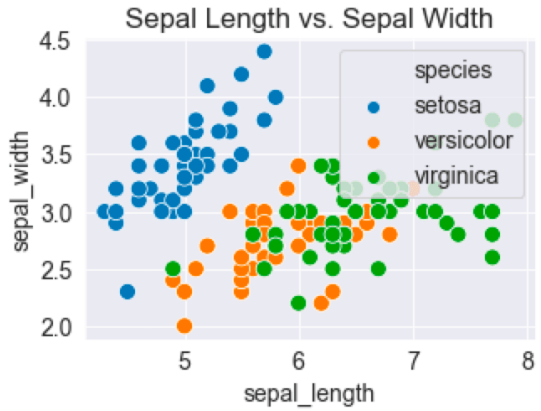


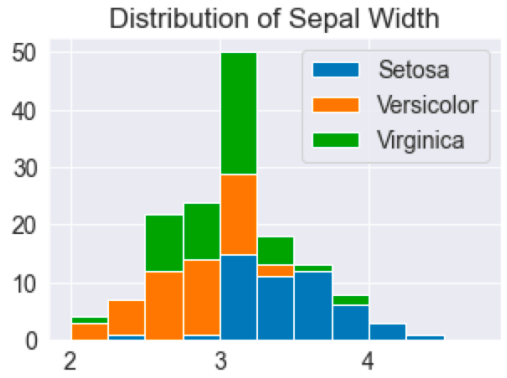
Images taken on 2023-09-xx

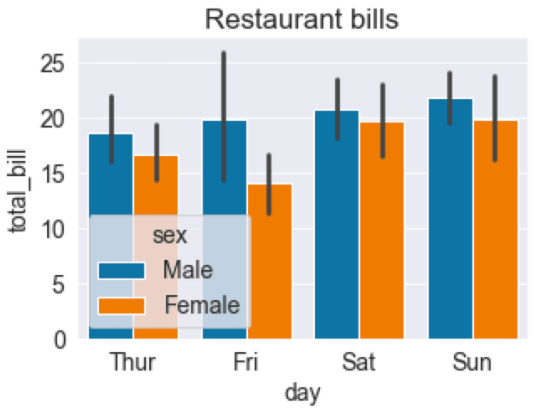


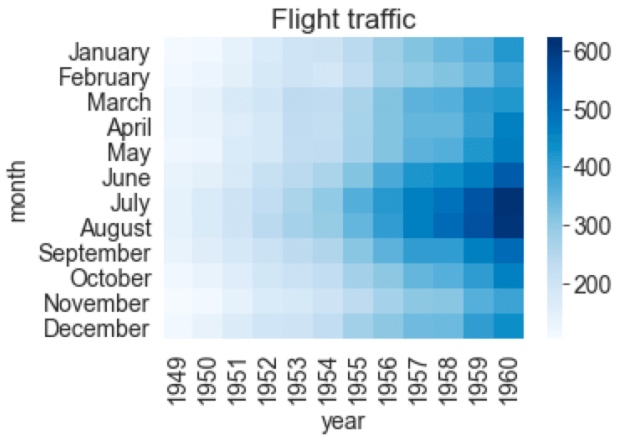
Data analysis

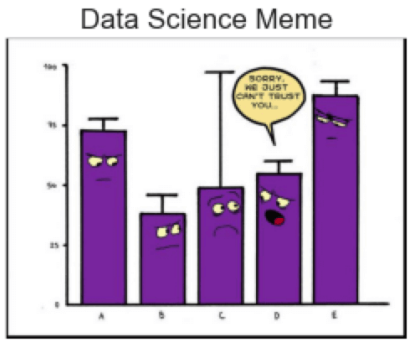












Graphical user interface (GUI)

- Design and programme graphical user interfaces with the Qt framework