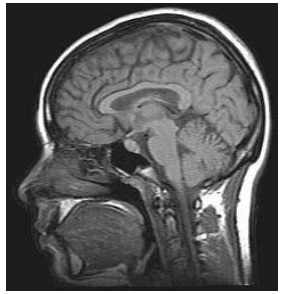
Computer Vision - Image processing

What is Computer Vision?

- **Computer vision** is the science and technology of machines that see.
- Concerned with the theory for building artificial systems that obtain information from images.
- The image data can take many forms, such as a video sequence, depth images, views from multiple cameras, or multi-dimensional data from a medical scanner





Computer Vision

Make computers understand images and videos.

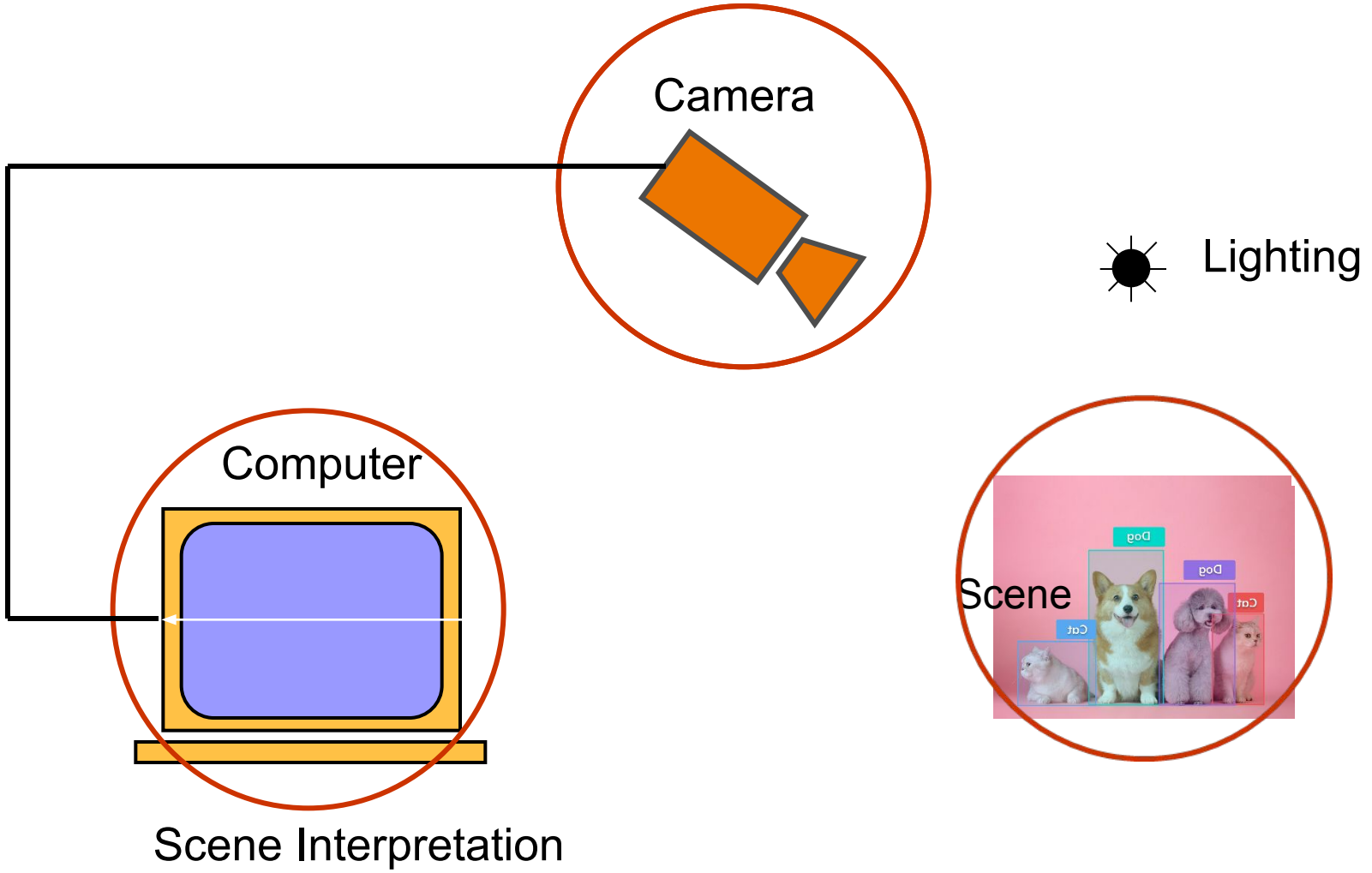
What kind of scene?

Where are the cars?

How far is the building?

…

Components of a computer vision system



Computer vision vs human vision

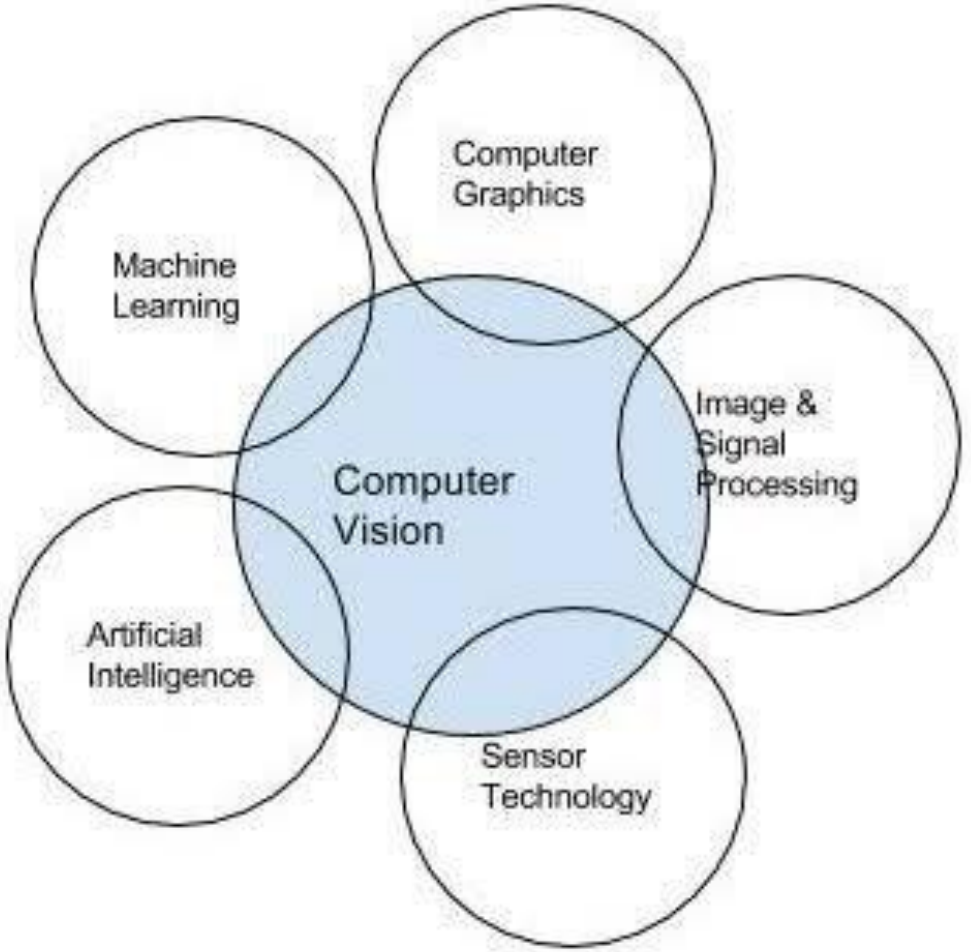
What we see

0	3	2	5	4	7	6	9	8
3	0	1	2	3	4	5	6	7
2	1	0	3	2	5	4	7	6
5	2	3	0	1	2	3	4	5
4	3	2	1	0	3	2	5	4
7	4	5	2	3	0	1	2	3
6	5	4	3	2	1	0	3	2
9	6	7	4	5	2	3	0	1
8	7	6	5	4	3	2	1	0

What a computer sees

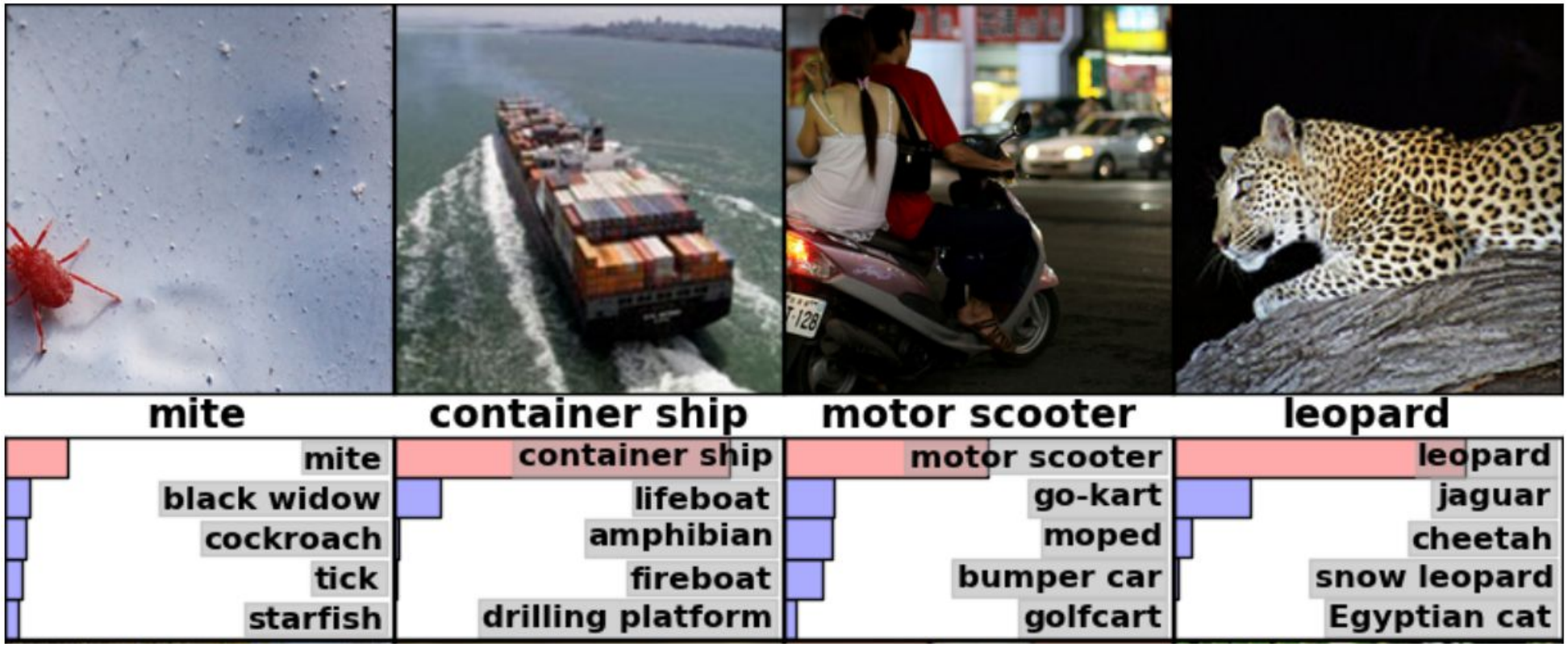
How does Computer vision works?

In simple computer vision is your computer's ability in processing the image data. So this can be an image, video or gif, etc. So the question is how does the computer achieve this?



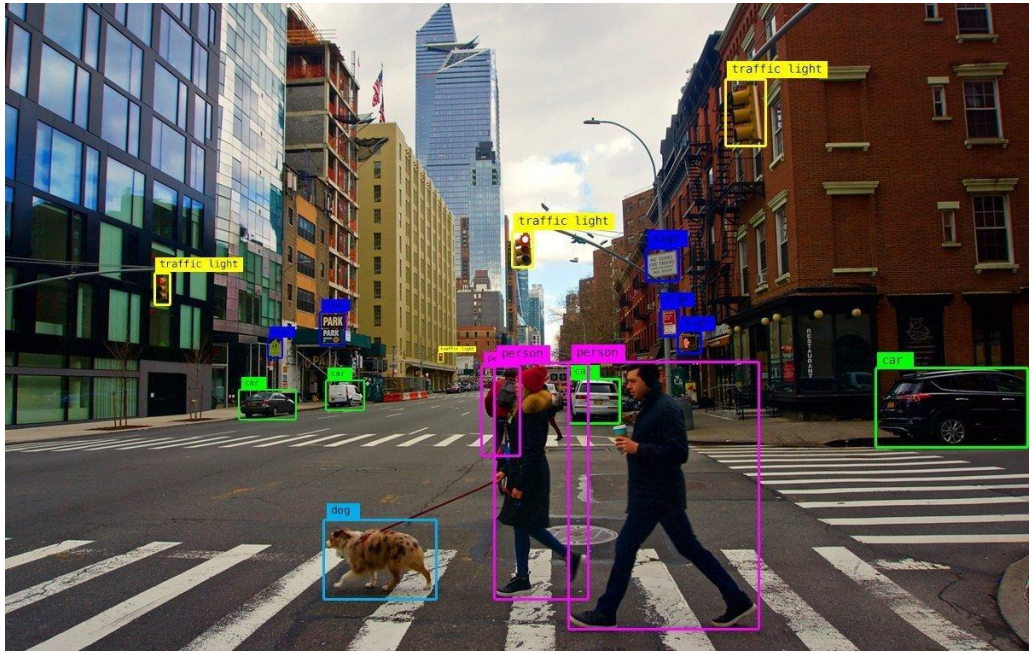
Applications of Computer Vision

Example:1 Image Classification

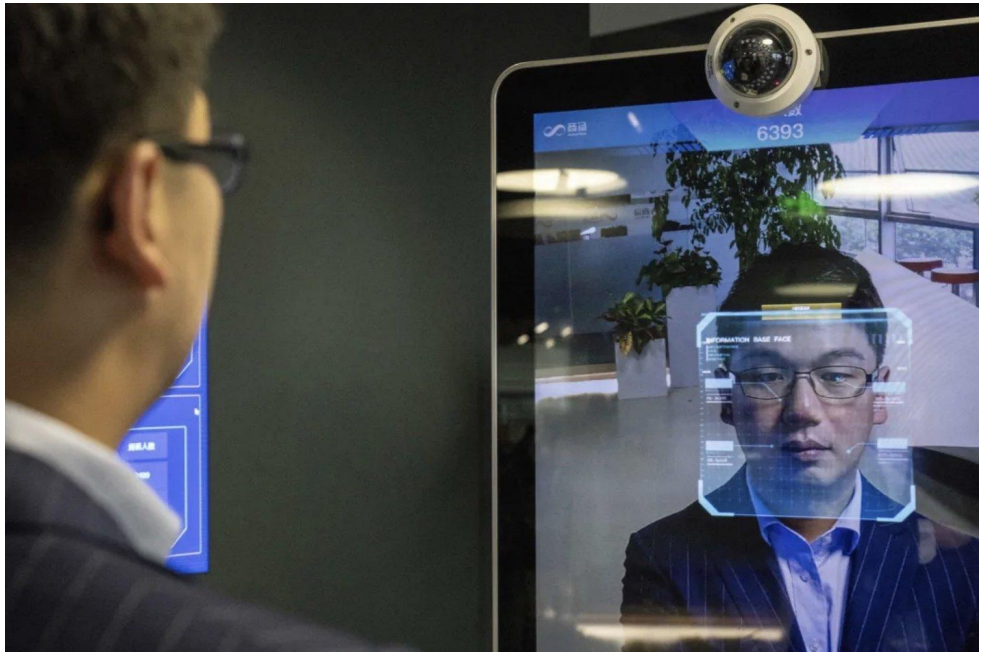


Applications of Computer Vision

Example:2 Object Detection

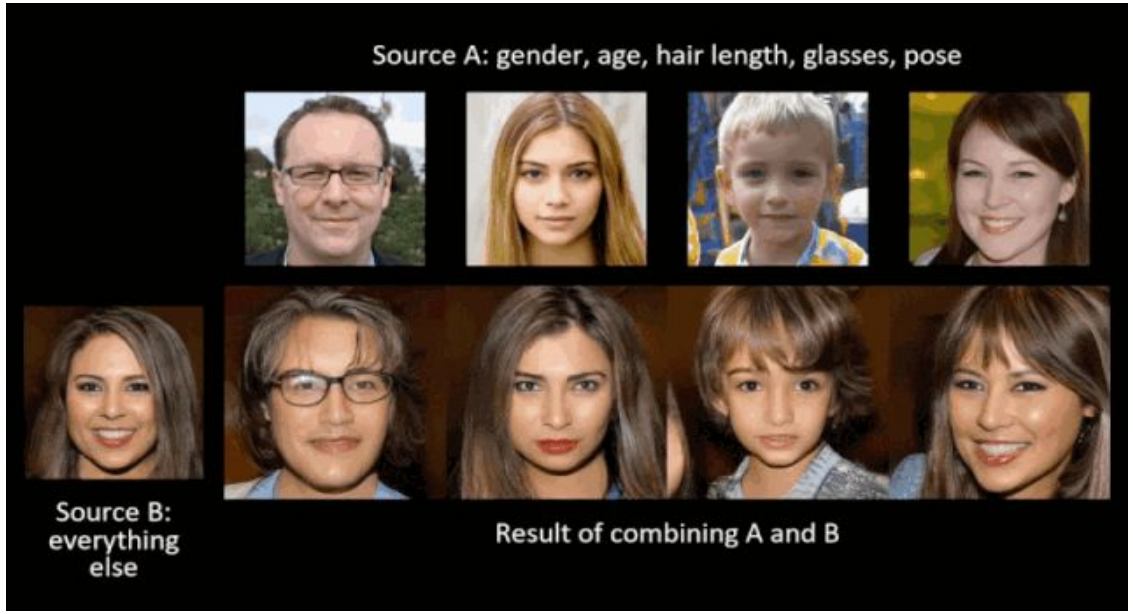


Example:3 Face Recognition

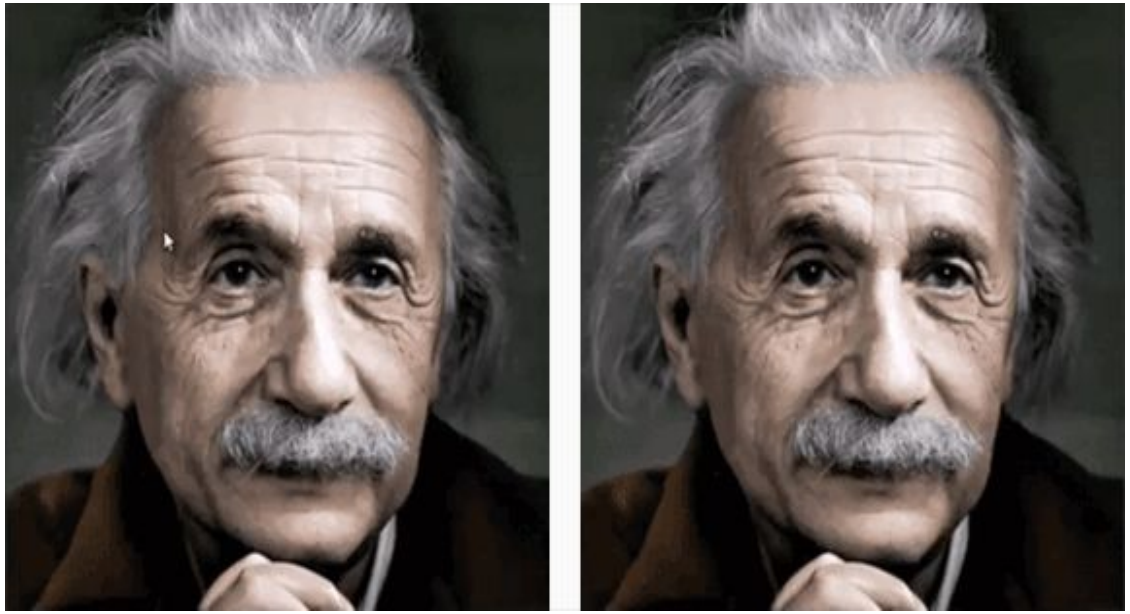


Applications of Computer Vision

Example:4 Face Generation



Example:5 Image Inpainting



Applications of Computer Vision

Example:6 Text to Image Generation

Request:

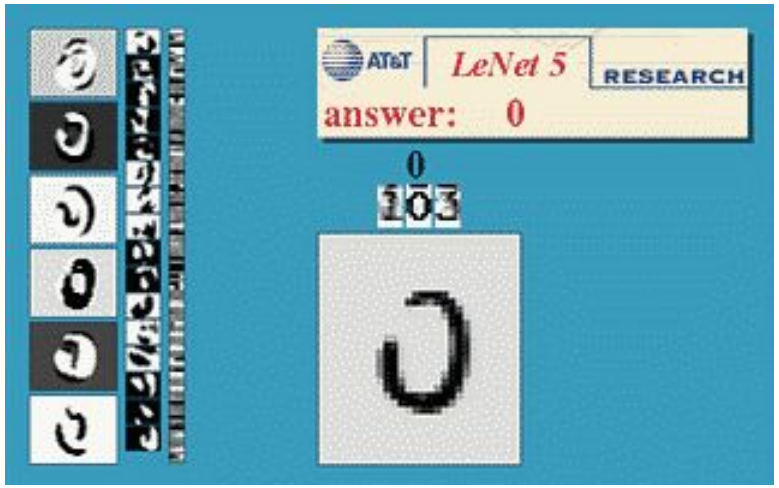
A rabbit detective sitting on a park bench and reading a newspaper in a Victorian setting.

Applications of Computer Vision

Example:7 Optical Character Recognition

Technology to convert scanned docs to text

- If you have a scanner, it probably came with OCR software



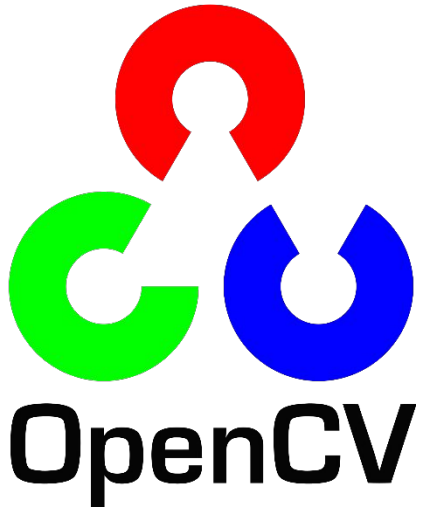
Digit recognition, AT&T labs

License plate readers

Computer Vision Tool

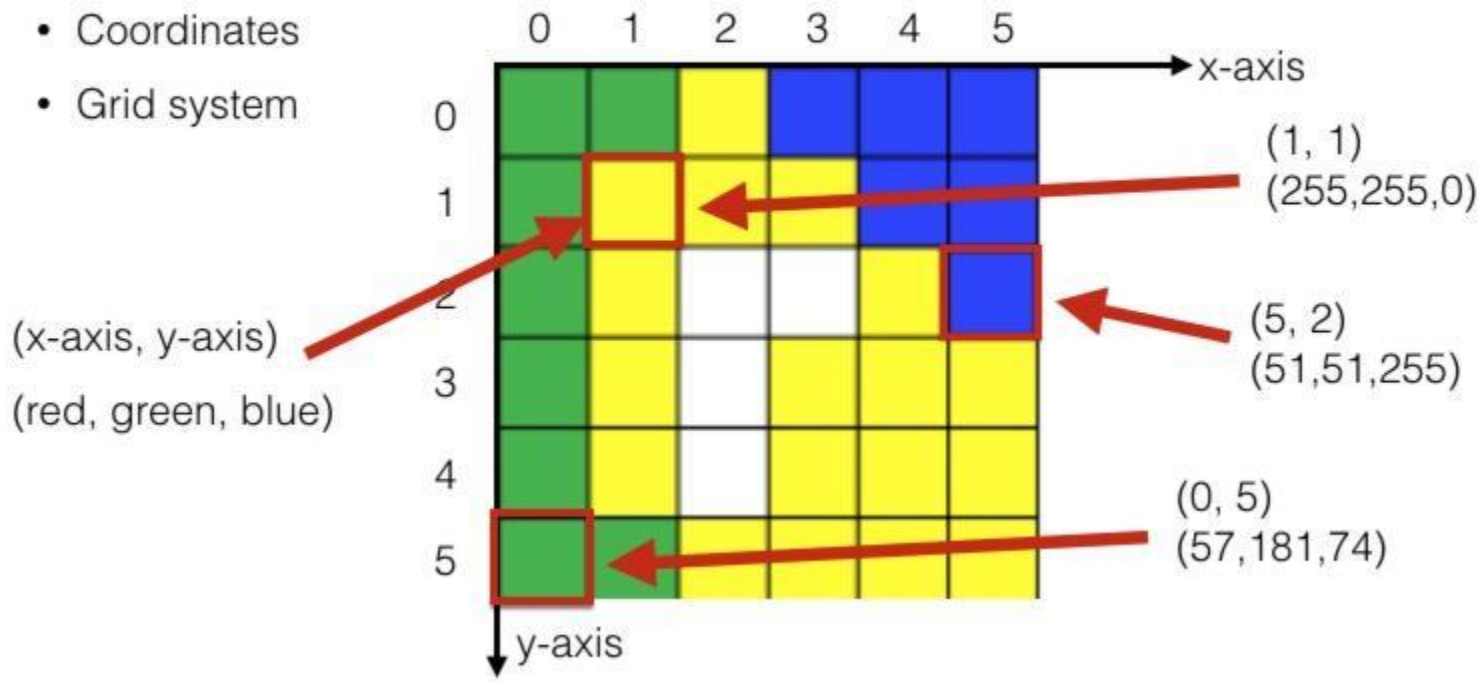
There are multiple computer vision algorithms and tools such as *OpenCV*, *Tensorflow*, *YOLO*, and *MATLAB*, But the most widely used tool is openCV:

- **OpenCV:** a real-time computer vision and machine learning software library. Provides infrastructure for computer vision applications that assist in face detection, recognition, 3D model extractions, and motion tracking.



Basic pre-processing tasks on Image using OpenCV.

Before diving into it, Firstly we should know how an image is interpreted.



Basic pre-processing tasks on Image using OpenCV

- Preview the image.
- Conversion from RGB to grayscale.
- Image Color Chanel
- Image Blurring
- Rotation
- Resizing
- Flipping

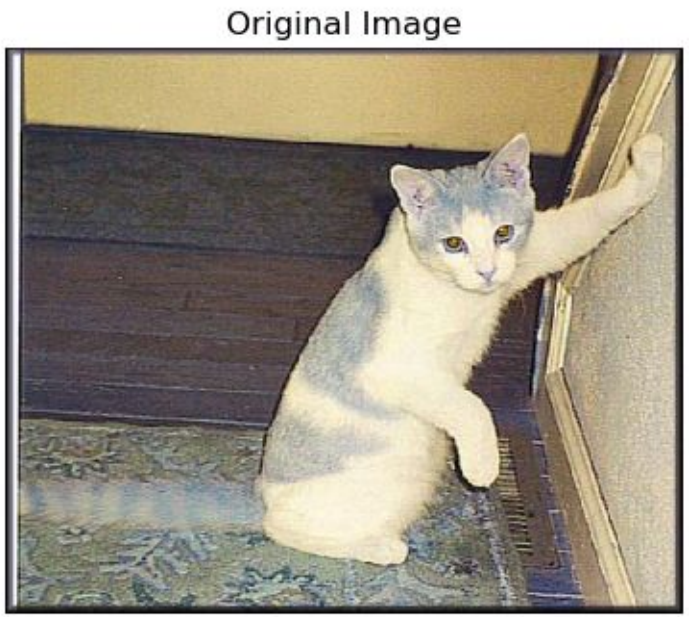
Basic pre-processing tasks on Image using OpenCV

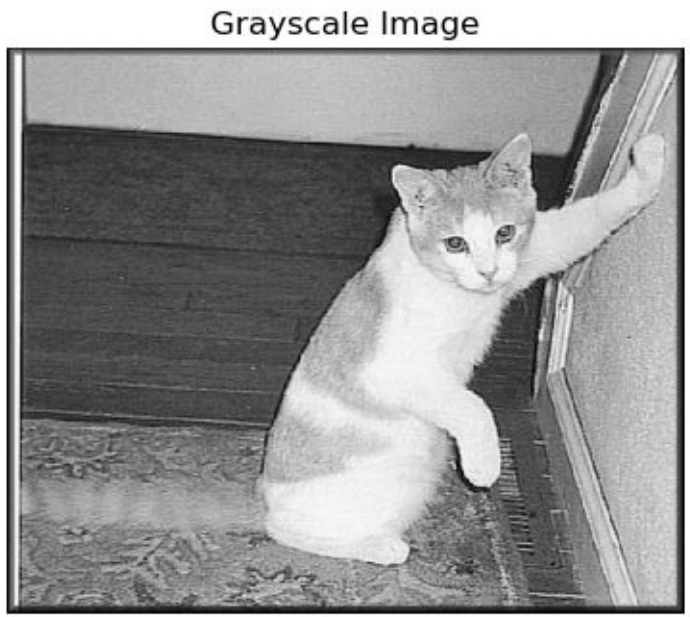
- **Preview the image.**

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

# read the image using OpenCV
img = cv2.imread(img_paths)

# display the image using matplotlib
plt.imshow(img)
plt.title('Cat Image')
plt.axis('off')
plt.show()
```

Basic pre-processing tasks on Image using OpenCV

- **Conversion from RGB to grayscale.**



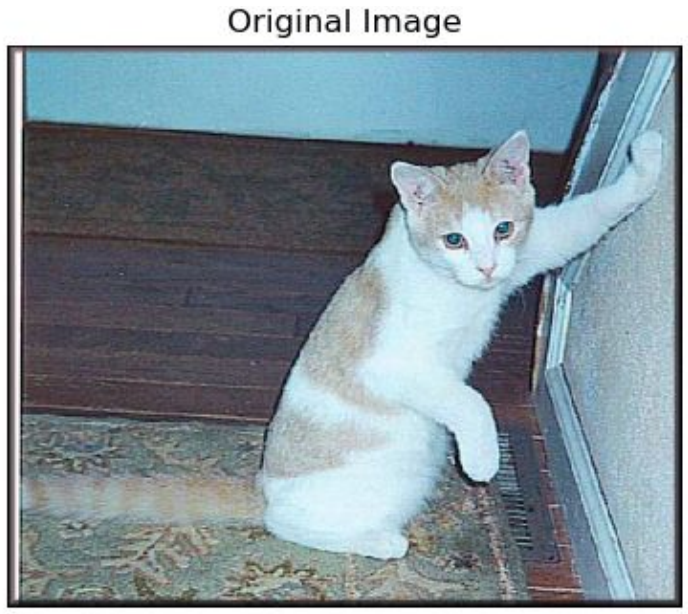


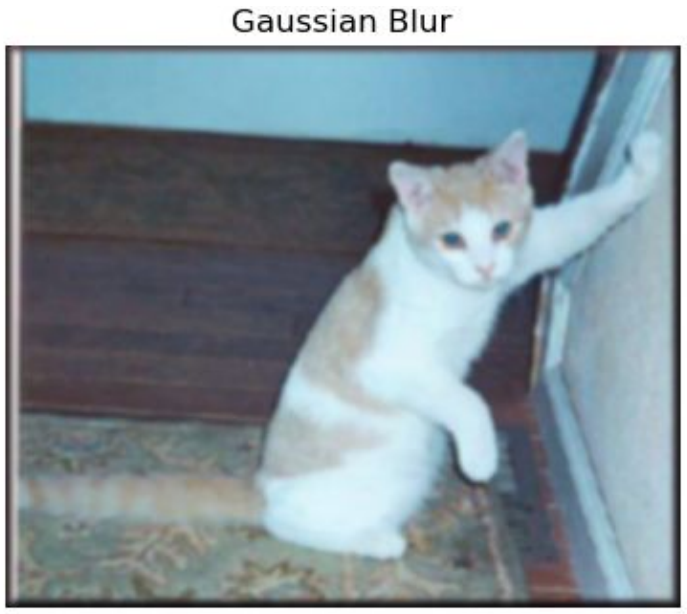
Basic pre-processing tasks on Image using OpenCV

- **Image Color Chanel**

Basic pre-processing tasks on Image using OpenCV

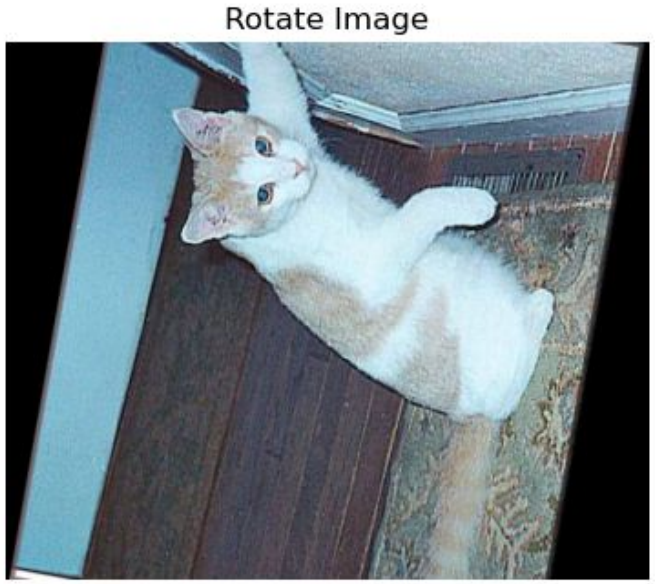
- **Image Blurring**



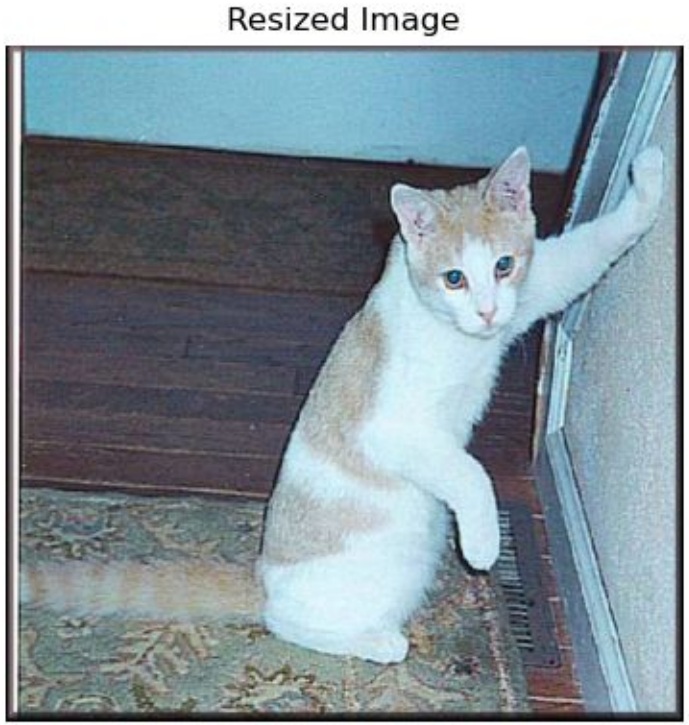


Basic pre-processing tasks on Image using OpenCV

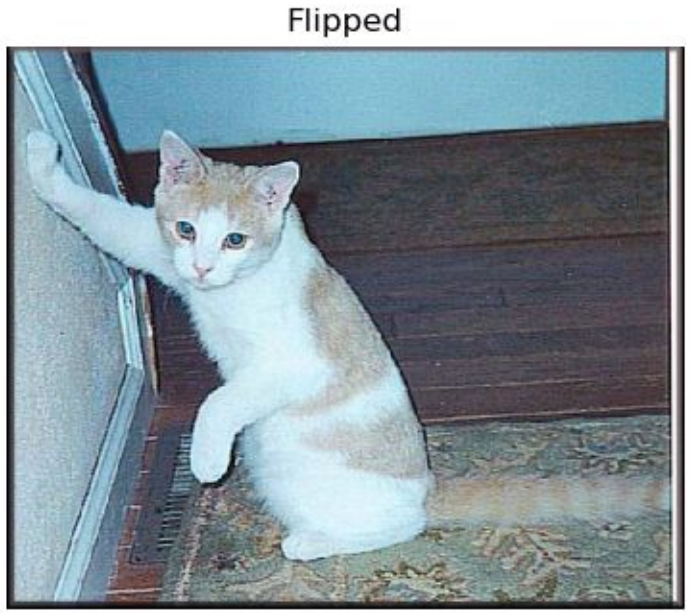
- **Rotation**



- **Resizing**



- **Flipping**



References

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