Let's play with Python and OpenCV

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Computer Vision

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- The computer vision is the science and engineering discipline concerned with making inferences about the external world.
- What is an image? Is an array. An array of pixels.
- The goal of the computer vision is to achieve something similar to the human perception.

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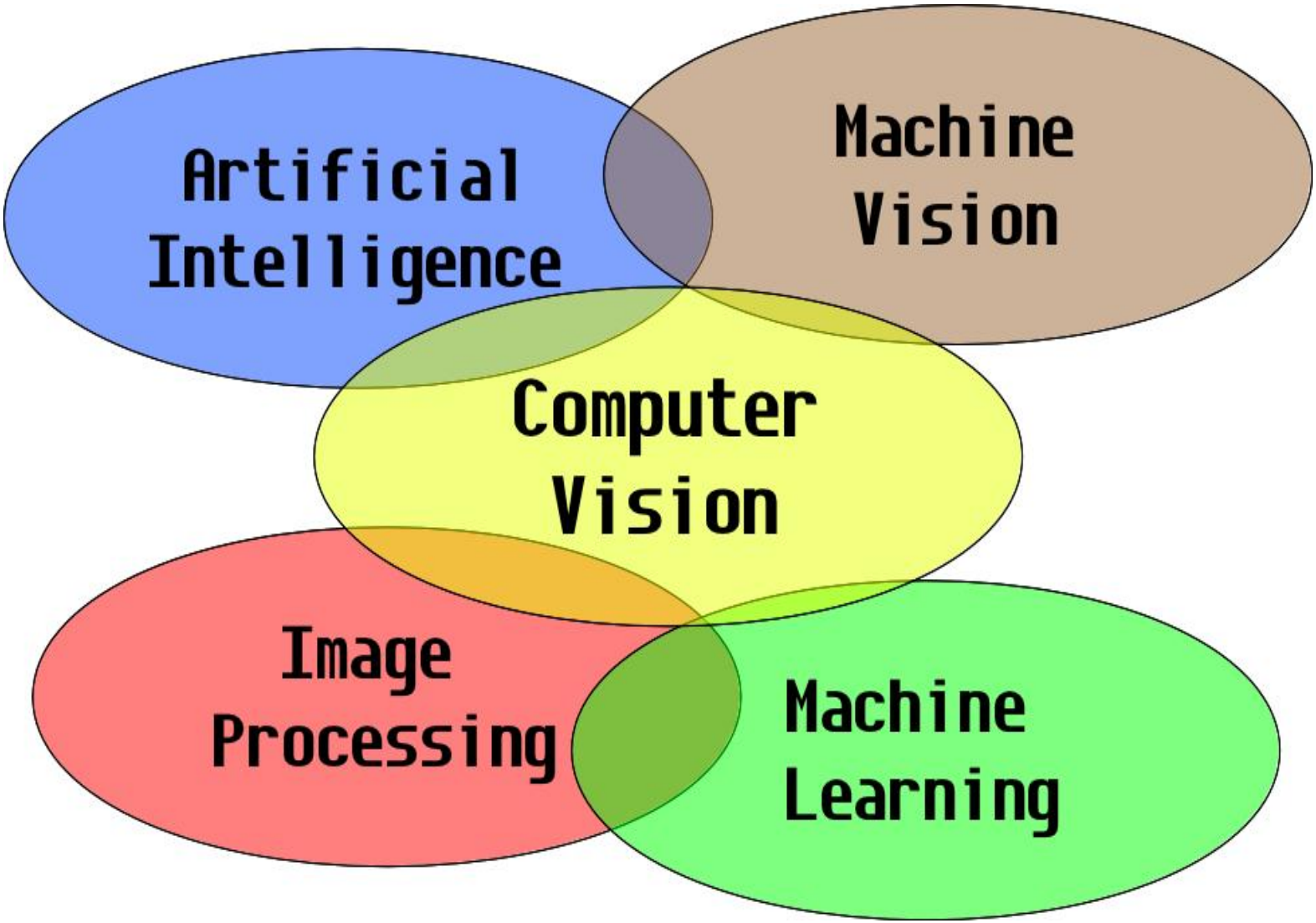

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  - Android and iOS

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  - Is fastest
  - Uses NumPy like images

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- `cv2.imwrite(path, image)`
- `cv2.waitKey(time)`
- `cv2.startWindowThread()`

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- `cv2.erode(image, kernel) -> image`

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- `cv2.dilate(image, kernel) -> image`
- `cv2.erode(image, kernel) -> image`
- `cv2.getStructuringElement(shape*, size) -> structure`

A very simple camera

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```
1 import cv2
2 cam = cv2.VideoCapture(0)
3 while True:
4   img = cam.read()[1]
5   cv2.imshow("Window", img)
6   if cv2.waitKey(5) == 32:
7     break
```

An example with FITS files

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- We will play with stars ;)
  - The first step is load a FITS file.
  - Apply `cvtColor` and `threshold` functions to the image.
  - Use `floodFill` function to coloring the stars.
  - Draw rectangles in the objects.
  - Slow?

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  - The first step is load a FITS file.
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  - Draw rectangles in the objects.
  - Slow? Ha', very slow.

Good idea and bad idea

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- Bad idea: Traverse all the items in an array.

```
1 for x in xrange(height):
2   for y in xrange(width):
3     image.itemset(x, y, 0, data.item(x,y))
```

- Worst idea: Use indexing syntax.

```
1 for x in xrange(height):
2   for y in xrange(width):
3     image[x, y] = data[x,y]
```

- Good ideas:
  - If you feel the need for speed, go for built-in functions. *Guido Van Rossum*.
  - Read `An Optimization Anecdote` in `http://www.python.org/doc/essays/list2str/`

Searching the yellow color

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- Use the simple camera and apply the blur filter.
- Convert the image to HSV color model and get a kind of threshold (color detection).
- Get the moments of the image
- Draw anything

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- Support for CUDA NVIDIA
- Support for Android
- Support for iOS
- Each version of OpenCV Python wrapper is more *pythonic*

Thanks!

About me

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Questions?