Demystifying the Computer Vison

A complex technology simplified

Hosted By

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What is CV?

From the concatenation of two terms computer and vision, a self-explanatory term Computer vision appears, often referred to as CV. This is none other than computing digital images to attempt to replicate the maximum abilities of Human vision.

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Are Image processing and Computer vision different

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Image processing is a transformation technique in which image is processed with smoothing, sharpening, contrasting, and various others to produce output which could be used in other tasks, Computer vision understands images and draw insights from it.

Open CV

OpenCV is an open source computer vision and machine learning software library.

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Installing OpenCV

Pre Requirement

- NumPy
- Matplotlib
- Run pip install opencv-python in the command line.

Importing and checking version

```
import cv2
cv2.__version__
```

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Reading and Displaying Images:

For any images, there are three primary colors Red, Green, and Blue represented by values in the range 0 to 255 for each color.
Collection of all three channels form an image.

Images can be read in three modes by passing integers -1,0,1 for unchanged, grayscale, and colored mode respectively.
By default, the value of the flag is 1.

```
img=cv2.imread('ml.png')
```

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Reading and Displaying Images:

cv2.waitKey() is a keyboard bound function in which the argument passed is in milliseconds.

If an argument passed is 0, it will wait infinitely and for other value, it will wait for that particular time and if any key is pressed during that duration, the program will proceed.

cv2.destroyAllWindows() closes all the windows created during the execution of the program.

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Resizing the image

Image resizing is the process of changing an image's size without keeping proportions

```
img=cv2.imread(‘ml.png’)
resized_image = cv2.resize(img, (150,80))
```

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Face Detection

Face Detection

The detection works only on grayscale images. So it is important to convert the color image to grayscale

detectMultiScale function is used to detect the faces.
It takes 3 arguments — the input image, scaleFactor and minNeighbours.
scaleFactor specifies how much the image size is reduced with each scale. minNeighbours specifies how many neighbors each candidate rectangle should have to retain it.

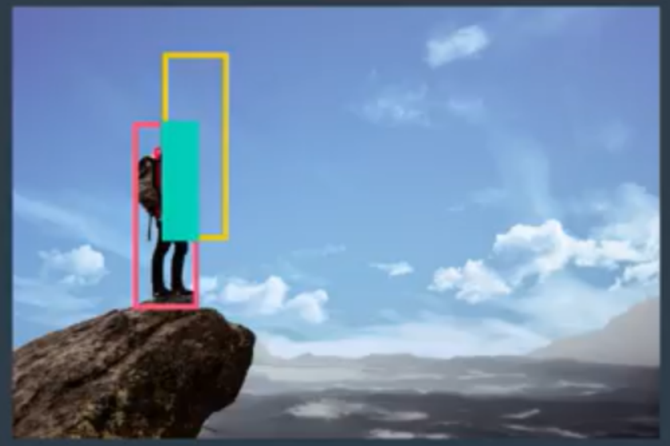
faces contains a list of coordinates for the rectangular regions where faces were found. We use these coordinates to draw the rectangles in our image.

YOLO

YOLO is a state-of-the-art, real-time object detection algorithm that is capable of detecting and classifying multiple objects from a single frame

Intersection Over Union (IOU)

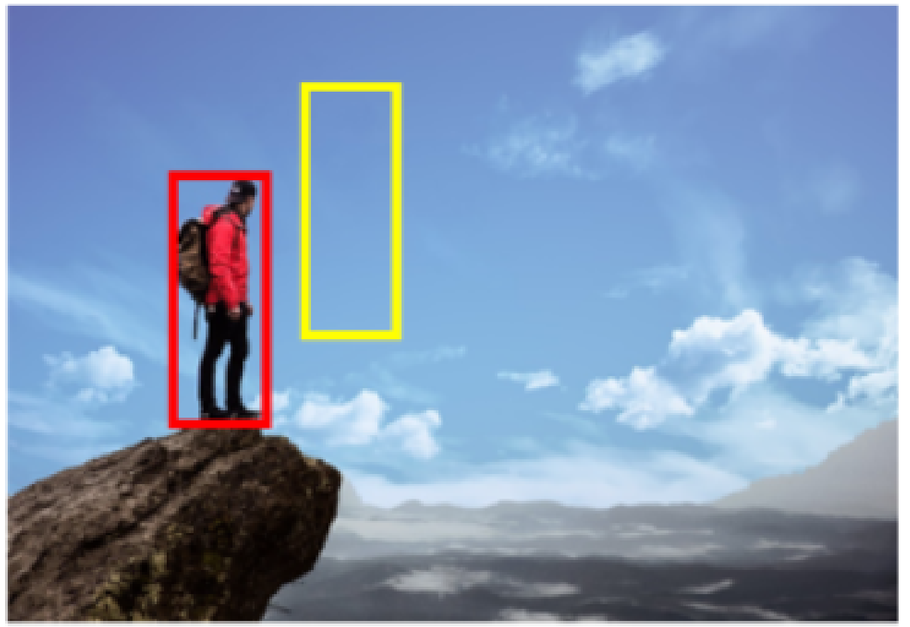
$$IOU = \frac{\text{Area of Intersection}}{\text{Area of Union of Both Rectangles}}$$



Area of Intersection

Area of Union of Both Rectangles

$$\text{IOU} = \frac{2000}{2000} = 1$$



$$\text{IOU} = \frac{0}{4000} = 0$$

Without Non Maximal Suppression

With Non Maximal Suppression

Gets rid of Bounding boxes

Any questions ?