

# Image Representation & Images stored as array of bytes.

1 byte = 8 bits  $\rightarrow$   $[0, 255]$  (range value)

## Three major image formats $\rightarrow$

1) RGB  $\rightarrow$   $h \times w \times 3$   
- use when (red, green, blue)

1) Color value of an image is important.

ex  $\rightarrow$  Predict if food is fresh or not.  
object segmentation.

- Expensive with processing & slow.

2) HSV  $\rightarrow$  hue  $\rightarrow$  Color (r, g, b)  
Saturation & Intensity of color  
Value  $\rightarrow$  Pixel value (brightness)

- Easier to filter & detect specific colors.

- Reduced search space to find color compared to rgb.

3) Grayscale & Two dimensional image array.  
- black and white colors.

- faster processing & computationally less expensive.

- use when structure & shape in image are important.

ex 1) Edge detection.

2) Medical imaging

Library & skimage & skimage image.

pip install skimage-image.

from skimage import io, color & Change image format.

↳ Input image to library.

ex image = io.imread(filename)

color.rgb2hex(image)

color.rgb2gray(image)

1) Resizing & Rescaling

why to do it? ↳ To bring image to a standard format.

2) All algorithms accept images in pre-defined format only. (input image size is fixed)

Resizing & Varying the # of pixels in an image.

↳ Crop image &

from skimage import transform ↳ new image shape

transform.resize(image, (x, y))

↳ original image

Rescaling & Shrinking or Enlarging by a scale factor & not dimensionally literally.

transform.rescale(image, scale = 0.9, channel\_axis = -1)

↳ tells, color channel is the last dimension in array.

## 2) Rotation & Flipping

why?

↳ To generate synthetic images.

- More images for algorithm to be trained on.

- Makes the algorithm more robust.

`transform.rotate(image, rotate = degree, rescale = True)`

`np.flip(image)`

`np.flipud(image)`

## 3) Intensity

↳ gray scale & pixel value.

2) rgb & brightness are intensity.

why play with intensity?

↳ Algorithms sensitive to intensity.

↳ Standardize images based on intensity.

↳ Improve image quality.

↳ intensity for skimage for gray scale is b/w 0 to 1 instead of 0-255.

from skimage import exposure & Intensity.

`exposure.rescale_intensity(image, in_range = (P2, P92))`

`exposure.adjust_gamma(image, gamma = 0.4)`

- brightness

## 4) Edge Detection

↳ To detect structure in the image.

- Identify boundaries or contours & where pixel values change sharply.

from skimage import filters

`filters.sobel_hpf(image)`

