

## 1. Introduction of Computer vision

Computer vision is a field of computer science that focuses on enabling computers to identify and understand objects and people in images and videos NOTE : for better understanding go through notes Difference between Human vision system and Computer vision system Human vision uses eyes and brain to see and understand, while computer vision uses a camera and computer to detect and recognize objects.

## 2. What is Image ?

A real image will represent as an array & that image will convert into pixel Pixel range between (0 - 255), where 0 = dark value, 255 = Highest / Brightest value Every pixel in image is stored in value between (0-255) Coloured image will be represented as RGB (Red, Green, Blue) Channels in image : 2D channel -> black and white || 3D channel -> Red, Green, Blue (RGB)

## 3. Numpy & Image connection

Image reading with Numpy & Matplotlib

```
In [3]: import numpy as np
```

```
In [4]: ones_arr = np.ones((5,5),dtype=int)
```

```
In [5]: ones_arr
```

```
Out[5]: array([[1, 1, 1, 1, 1],
               [1, 1, 1, 1, 1],
               [1, 1, 1, 1, 1],
               [1, 1, 1, 1, 1],
               [1, 1, 1, 1, 1]])
```

```
In [6]: ones_arr * 255
```

```
Out[6]: array([[255, 255, 255, 255, 255],
               [255, 255, 255, 255, 255],
               [255, 255, 255, 255, 255],
               [255, 255, 255, 255, 255],
               [255, 255, 255, 255, 255]])
```

```
In [7]: import matplotlib.pyplot as plt
```

```
In [8]: #!/matplotlib inline # all the graph should keep inside the line
```

```
In [9]: from PIL import Image # Python imaging Library
```

```
In [10]: ele = Image.open(r"D:\Samson resume\Dog_img.jpg")
```

In [11]: `ele`

Out[11]:



In [16]: `type(ele)`

Out[16]: `PIL.JpegImagePlugin.JpegImageFile`

```
In [17]: ele_arr = np.asarray(ele)
         ele_arr
```

```
Out[17]: array([[159, 173, 174],
                [165, 179, 180],
                [172, 186, 187],
                ...,
                [194, 198, 207],
                [191, 195, 204],
                [188, 192, 201]],

               [[162, 176, 177],
                [168, 182, 183],
                [175, 189, 192],
                ...,
                [196, 200, 209],
                [193, 197, 206],
                [190, 194, 203]],

               [[170, 181, 183],
                [175, 186, 190],
                [181, 192, 196],
                ...,
                [197, 201, 210],
                [194, 198, 207],
                [192, 196, 205]],

               ...,

               [[180, 185, 179],
                [181, 186, 180],
                [184, 189, 185],
                ...,
                [193, 195, 194],
                [191, 191, 191],
                [191, 191, 189]],

               [[170, 175, 168],
                [173, 178, 171],
                [178, 183, 177],
                ...,
                [190, 190, 188],
                [186, 185, 183],
                [185, 181, 178]],

               [[167, 173, 163],
                [171, 176, 169],
                [177, 182, 176],
                ...,
                [189, 188, 186],
                [185, 181, 178],
                [180, 175, 171]]], dtype=uint8)
```

```
In [18]: type(ele_arr)
```

Out[18]: numpy.ndarray

```
In [21]: plt.imshow(ele_arr) # plt.show(horse_arr) new os  
plt.show() # new os
```



```
In [22]: ele_arr.shape
```

Out[22]: (4206, 3000, 3)

```
In [23]: ele_red = ele_arr.copy()
```

```
In [24]: ele_red
```

```

Out[24]: array([[[159, 173, 174],
                  [165, 179, 180],
                  [172, 186, 187],
                  ...,
                  [194, 198, 207],
                  [191, 195, 204],
                  [188, 192, 201]],

                [[162, 176, 177],
                  [168, 182, 183],
                  [175, 189, 192],
                  ...,
                  [196, 200, 209],
                  [193, 197, 206],
                  [190, 194, 203]],

                [[170, 181, 183],
                  [175, 186, 190],
                  [181, 192, 196],
                  ...,
                  [197, 201, 210],
                  [194, 198, 207],
                  [192, 196, 205]],

                ...,

                [[180, 185, 179],
                  [181, 186, 180],
                  [184, 189, 185],
                  ...,
                  [193, 195, 194],
                  [191, 191, 191],
                  [191, 191, 189]],

                [[170, 175, 168],
                  [173, 178, 171],
                  [178, 183, 177],
                  ...,
                  [190, 190, 188],
                  [186, 185, 183],
                  [185, 181, 178]],

                [[167, 173, 163],
                  [171, 176, 169],
                  [177, 182, 176],
                  ...,
                  [189, 188, 186],
                  [185, 181, 178],
                  [180, 175, 171]]], dtype=uint8)

```

```
In [25]: ele_arr == ele_red
```

```

Out[25]: array([[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]],

              [[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]],

              [[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]],

              ...,

              [[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]],

              [[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]],

              [[ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True],
               ...,
               [ True,  True,  True],
               [ True,  True,  True],
               [ True,  True,  True]]])

```

```
In [26]: plt.imshow(ele_red)
```

```
Out[26]: <matplotlib.image.AxesImage at 0x1c8208c2cf0>
```



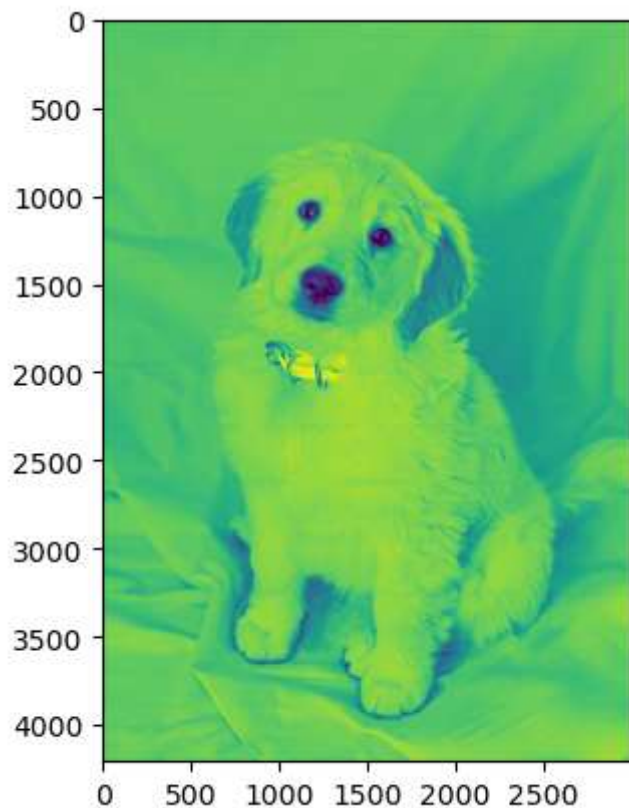


```
In [27]: ele_red.shape
```

```
Out[27]: (4206, 3000, 3)
```

```
In [28]: # R G B  
plt.imshow(ele_red[:, :, 0])
```

```
Out[28]: <matplotlib.image.AxesImage at 0x1c82089da00>
```



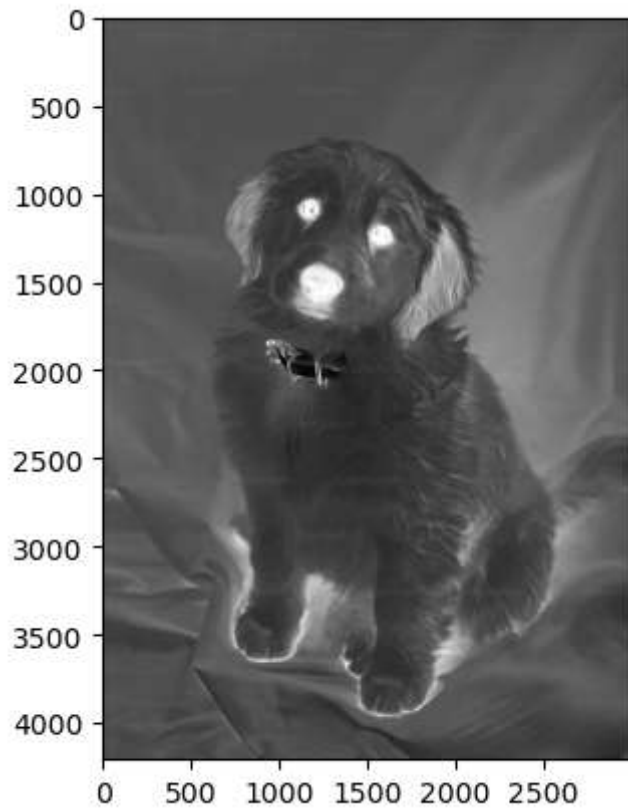
```
In [29]: ele_red[:, :, 0]
```

```
Out[29]: array([[159, 165, 172, ..., 194, 191, 188],
                [162, 168, 175, ..., 196, 193, 190],
                [170, 175, 181, ..., 197, 194, 192],
                ...,
                [180, 181, 184, ..., 193, 191, 191],
                [170, 173, 178, ..., 190, 186, 185],
                [167, 171, 177, ..., 189, 185, 180]], dtype=uint8)
```

```
In [30]: plt.imshow(ele_red[:, :, 0], cmap='Greys')
```

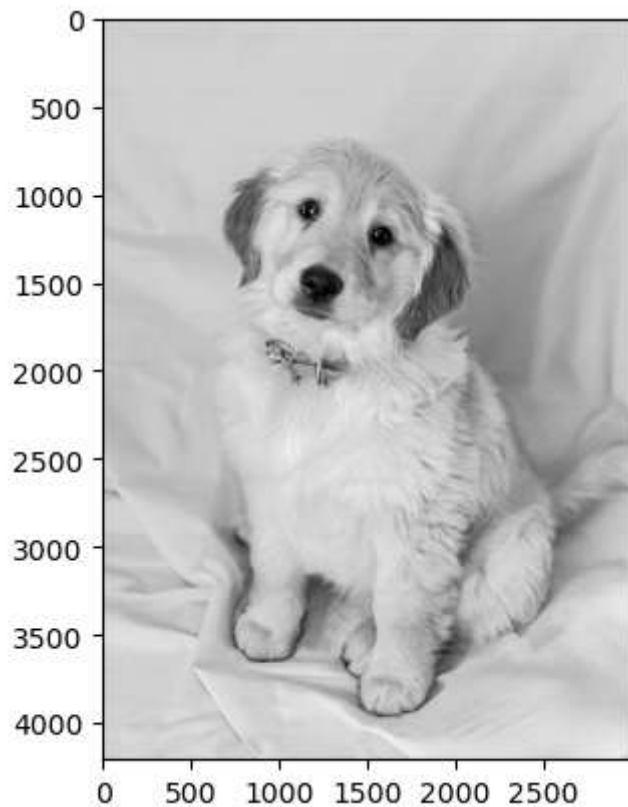
```
Out[30]: <matplotlib.image.AxesImage at 0x1c820879eb0>
```





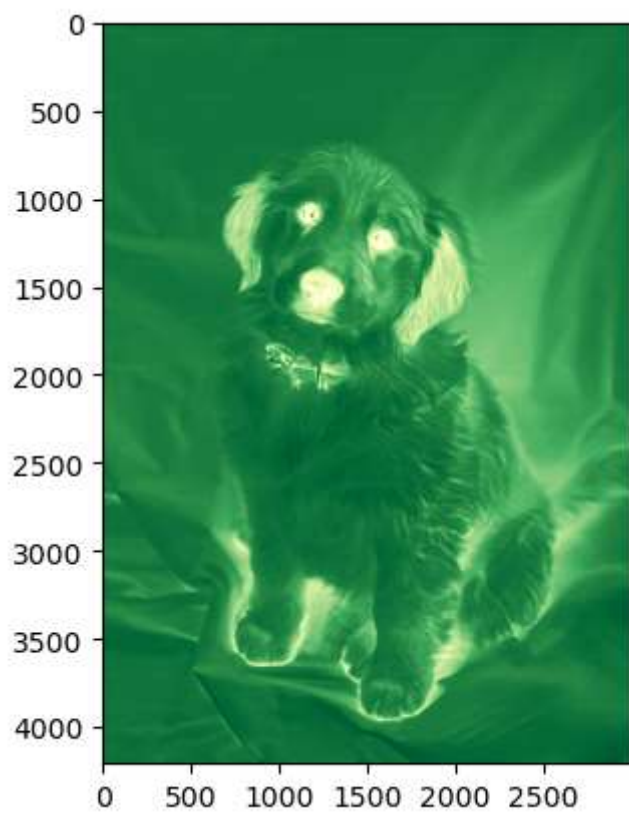
```
In [31]: plt.imshow(ele_red[:, :, 1], cmap='grey')
```

```
Out[31]: <matplotlib.image.AxesImage at 0x1c82089f380>
```



```
In [32]: plt.imshow(ele_red[:, :, 1], cmap='YlGn') # plt.show()
```

Out[32]: <matplotlib.image.AxesImage at 0x1c8209cfb90>



In [ ]:

In [ ]: