

## Image analysis using NUMPY + MATPLOTLIB + PIL

```
In [ ]: # NUMPY -- ND ARRAY  
# MATPLOTLIB -- VISUALIZATION  
# PIL -- PYTHON IMAGE LIBRARY
```

```
In [ ]: # Image -- (1-255) pixel  
# 0 -- black color  
# 255 -- dark color
```

```
In [1]: 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 [11]: import matplotlib.pyplot as plt
```

```
In [ ]: !matplotlib inline
```

```
In [21]: from PIL import Image
```

```
In [24]: horse_image = Image.open(r"C:\Users\haris\Desktop\horse_image.jpeg")
```

In [25]: horse\_image

Out[25]:



In [28]: elephant\_image = Image.open(r"C:\Users\haris\Desktop\elephant\_image.jpg")

In [29]: elephant\_image

Out[29]:



In [30]: type(horse\_image)

Out[30]: PIL.JpegImagePlugin.JpegImageFile

In [32]: horse\_arr = np.asarray(horse\_image)  
horse\_arr

Out[32]: array([[[15, 17, 29],  
[15, 17, 29],  
[15, 17, 29],  
...,  
[23, 38, 35],  
[19, 34, 31],  
[14, 30, 27]],  
  
[[15, 17, 29],  
[15, 17, 29],  
[15, 17, 29],  
...,  
[24, 39, 36],  
[22, 37, 34],  
[20, 36, 33]],  
  
[[15, 17, 29],  
[15, 17, 29],  
[15, 17, 29],  
...,  
[26, 41, 38],  
[25, 40, 37],  
[24, 40, 37]],  
  
...,  
  
[[49, 50, 44],  
[40, 41, 33],  
[35, 34, 29],  
...,  
[14, 30, 29],  
[13, 25, 25],  
[11, 23, 23]],  
  
[[45, 50, 44],  
[38, 43, 36],  
[33, 35, 30],  
...,  
[11, 25, 25],  
[12, 24, 24],  
[16, 26, 27]],  
  
[[33, 40, 33],  
[33, 40, 33],  
[33, 38, 32],  
...,  
[12, 26, 26],  
[16, 26, 27],  
[22, 32, 33]]], shape=(2334, 3502, 3), dtype=uint8)

In [33]: type(horse\_arr)

Out[33]: numpy.ndarray

```
In [34]: plt.imshow(horse_arr)
```

```
Out[34]: <matplotlib.image.AxesImage at 0x1ae86f12e70>
```



```
In [35]: horse_arr.shape
```

```
Out[35]: (2334, 3502, 3)
```

```
In [36]: horse_red = horse_arr.copy()
```

```
In [37]: horse_red
```

```
Out[37]: array([[[15, 17, 29],  
                  [15, 17, 29],  
                  [15, 17, 29],  
                  ...,  
                  [23, 38, 35],  
                  [19, 34, 31],  
                  [14, 30, 27]],  
  
                 [[[15, 17, 29],  
                  [15, 17, 29],  
                  [15, 17, 29],  
                  ...,  
                  [24, 39, 36],  
                  [22, 37, 34],  
                  [20, 36, 33]],  
  
                 [[[15, 17, 29],  
                  [15, 17, 29],  
                  [15, 17, 29],  
                  ...,  
                  [26, 41, 38],  
                  [25, 40, 37],  
                  [24, 40, 37]],  
  
                 ...,  
  
                 [[[49, 50, 44],  
                  [40, 41, 33],  
                  [35, 34, 29],  
                  ...,  
                  [14, 30, 29],  
                  [13, 25, 25],  
                  [11, 23, 23]],  
  
                 [[[45, 50, 44],  
                  [38, 43, 36],  
                  [33, 35, 30],  
                  ...,  
                  [11, 25, 25],  
                  [12, 24, 24],  
                  [16, 26, 27]],  
  
                 [[[33, 40, 33],  
                  [33, 40, 33],  
                  [33, 38, 32],  
                  ...,  
                  [12, 26, 26],  
                  [16, 26, 27],  
                  [22, 32, 33]]], shape=(2334, 3502, 3), dtype=uint8)
```

```
In [38]: horse_red == horse_arr
```

```
Out[38]: 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]]], shape=(2334, 3502, 3))
```

```
In [39]: plt.imshow(horse_red)
```

```
Out[39]: <matplotlib.image.AxesImage at 0x1ae87091610>
```



```
In [40]: plt.imshow(horse_red[:, :, 0])
```

```
Out[40]: <matplotlib.image.AxesImage at 0x1ae88525550>
```



```
In [41]: horse_red[:, :, 0]
```

```
Out[41]: array([[15, 15, 15, ..., 23, 19, 14],  
   [15, 15, 15, ..., 24, 22, 20],  
   [15, 15, 15, ..., 26, 25, 24],  
   ...,  
   [49, 40, 35, ..., 14, 13, 11],  
   [45, 38, 33, ..., 11, 12, 16],  
   [33, 33, 33, ..., 12, 16, 22]]], shape=(2334, 3502), dtype=uint8)
```

```
In [42]: plt.imshow(horse_red[:, :, 0], cmap="Greys")
```

```
Out[42]: <matplotlib.image.AxesImage at 0x1ae885277d0>
```



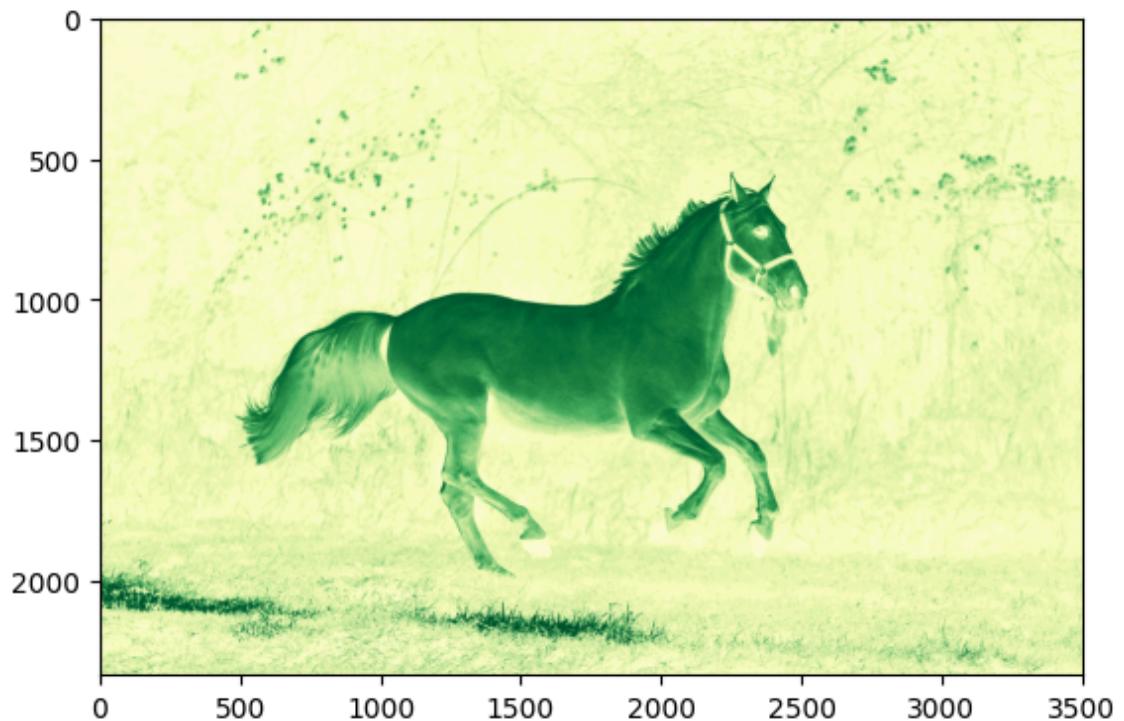
```
In [43]: plt.imshow(horse_red[:, :, 1], cmap="grey")
```

```
Out[43]: <matplotlib.image.AxesImage at 0x1ae88516b10>
```



```
In [44]: plt.imshow(horse_red[:, :, 1], cmap="YlGn")
```

```
Out[44]: <matplotlib.image.AxesImage at 0x1ae8854eb10>
```



```
In [ ]:
```

