Image Analysis using NUMPY + MATPLOTLIB + PIL

In [7]:
```
import numpy as np
```

In [14]:
```
ones_arr=np.ones((5,5),dtype=int)
```

In [16]:
```
ones_arr
```

Out[16]:
```
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 [18]:
```
ones_arr*255
```

Out[18]:
```
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 [20]:
```
import matplotlib.pyplot as plt
```

In [28]:
```
#matplotlib inline # all the graph should keep inside the line
```

In [30]:
```
from PIL import Image # python imaging library
```

In [36]:
```
car_image=Image.open(r'C:\Users\VARDHAN REDDY\Desktop\DATA SCIENCE AND AI\range_rov
```

In [38]:
```
car_image
```

Out[38]:

In [42]:
```
bike=Image.open(r'C:\Users\VARDHAN REDDY\Desktop\DATA SCIENCE AND AI\1040307.jpg')
```

In [48]:
```
bike
```

Out[48]:

In [50]:
```
type(bike)
```

Out[50]:
```
PIL.JpegImagePlugin.JpegImageFile
```

In [52]:
```
bike_arr=np.asarray(bike)
bike_arr
```

Out[52]:
```
array([[[ 58,  59,  63],
        [ 61,  62,  66],
        [ 62,  63,  67],
        ...,
        [104,  96,  77],
        [103,  95,  76],
        [104,  96,  77]],

       [[ 61,  62,  66],
        [ 60,  61,  65],
        [ 59,  60,  64],
        ...,
        [103,  95,  76],
        [104,  96,  77],
        [104,  96,  77]],

       [[ 62,  63,  67],
        [ 59,  60,  64],
        [ 58,  59,  63],
        ...,
        [103,  95,  76],
        [105,  97,  78],
        [105,  97,  78]],

       ...,

       [[ 61,  59,  60],
        [ 60,  58,  59],
        [ 60,  58,  59],
        ...,
        [ 32,  32,  32],
        [ 31,  31,  31],
        [ 34,  34,  34]],

       [[ 60,  58,  59],
        [ 59,  57,  58],
        [ 60,  58,  59],
        ...,
        [ 27,  27,  27],
        [ 27,  27,  27],
        [ 28,  28,  28]],

       [[ 59,  57,  58],
        [ 59,  57,  58],
        [ 61,  59,  60],
        ...,
        [ 25,  25,  25],
        [ 25,  25,  25],
        [ 26,  26,  26]]], dtype=uint8)
```

In [54]:
```
type(bike_arr)
```

Out[54]:
```
numpy.ndarray
```

In [56]:
```
plt.imshow(bike_arr)
plt.show()
```

In [58]:
```
type(bike)
```

Out[58]:
```
PIL.JpegImagePlugin.JpegImageFile
```

In [60]:
```
bike_arr=np.asarray(bike)
bike_arr
```

Out[60]:
```
array([[[ 58,  59,  63],
        [ 61,  62,  66],
        [ 62,  63,  67],
        ...,
        [104,  96,  77],
        [103,  95,  76],
        [104,  96,  77]],

       [[ 61,  62,  66],
        [ 60,  61,  65],
        [ 59,  60,  64],
        ...,
        [103,  95,  76],
        [104,  96,  77],
        [104,  96,  77]],

       [[ 62,  63,  67],
        [ 59,  60,  64],
        [ 58,  59,  63],
        ...,
        [103,  95,  76],
        [105,  97,  78],
        [105,  97,  78]],

       ...,

       [[ 61,  59,  60],
        [ 60,  58,  59],
        [ 60,  58,  59],
        ...,
        [ 32,  32,  32],
        [ 31,  31,  31],
        [ 34,  34,  34]],

       [[ 60,  58,  59],
        [ 59,  57,  58],
        [ 60,  58,  59],
        ...,
        [ 27,  27,  27],
        [ 27,  27,  27],
        [ 28,  28,  28]],

       [[ 59,  57,  58],
        [ 59,  57,  58],
        [ 61,  59,  60],
        ...,
        [ 25,  25,  25],
        [ 25,  25,  25],
        [ 26,  26,  26]]], dtype=uint8)
```

In [62]:
```
type(bike_arr)
```

Out[62]:
```
numpy.ndarray
```

In [66]:
```
plt.imshow(bike_arr)
plt.show()
```

In [68]:
```
bike_arr.shape
```

Out[68]: (2870, 4724, 3)

In [70]:
```
bike_red=bike_arr.copy()
```

In [72]:
```
bike_red
```

Out[72]:
```
array([[[ 58,  59,  63],
        [ 61,  62,  66],
        [ 62,  63,  67],
        ...,
        [104,  96,  77],
        [103,  95,  76],
        [104,  96,  77]],

       [[ 61,  62,  66],
        [ 60,  61,  65],
        [ 59,  60,  64],
        ...,
        [103,  95,  76],
        [104,  96,  77],
        [104,  96,  77]],

       [[ 62,  63,  67],
        [ 59,  60,  64],
        [ 58,  59,  63],
        ...,
        [103,  95,  76],
        [105,  97,  78],
        [105,  97,  78]],

       ...,

       [[ 61,  59,  60],
        [ 60,  58,  59],
        [ 60,  58,  59],
        ...,
        [ 32,  32,  32],
        [ 31,  31,  31],
        [ 34,  34,  34]],

       [[ 60,  58,  59],
        [ 59,  57,  58],
        [ 60,  58,  59],
        ...,
        [ 27,  27,  27],
        [ 27,  27,  27],
        [ 28,  28,  28]],

       [[ 59,  57,  58],
        [ 59,  57,  58],
        [ 61,  59,  60],
        ...,
        [ 25,  25,  25],
        [ 25,  25,  25],
        [ 26,  26,  26]]], dtype=uint8)
```

In [74]:
```
bike_red==bike_arr
```

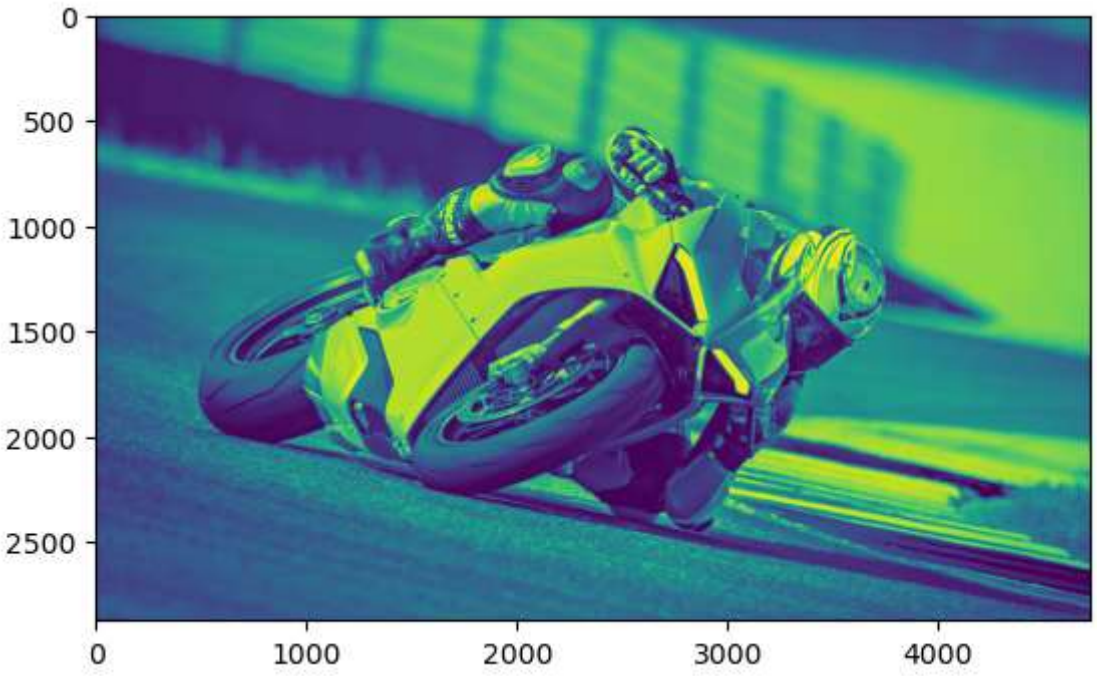
Out[74]:
```
array([[[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ 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 [76]:
```
plt.imshow(bike_red)
plt.show()
```

In [78]:
```
bike_red.shape
```

Out[78]: (2870, 4724, 3)

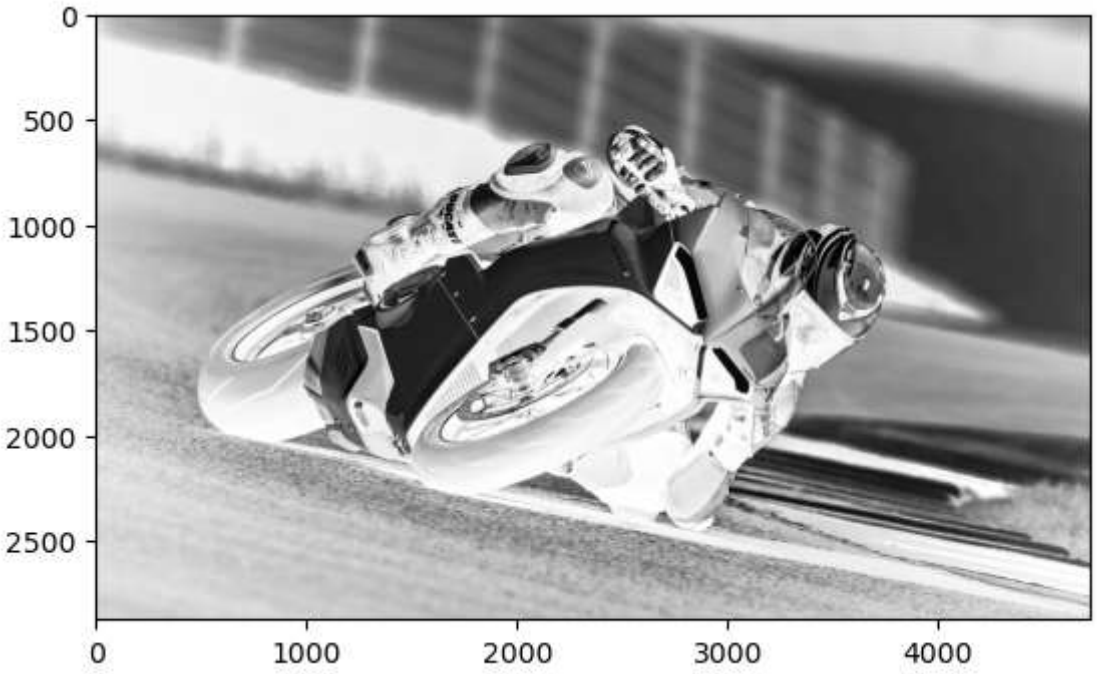
In [80]:
```
# R G B
plt.imshow(bike_red[:,:,0])
plt.show()
```



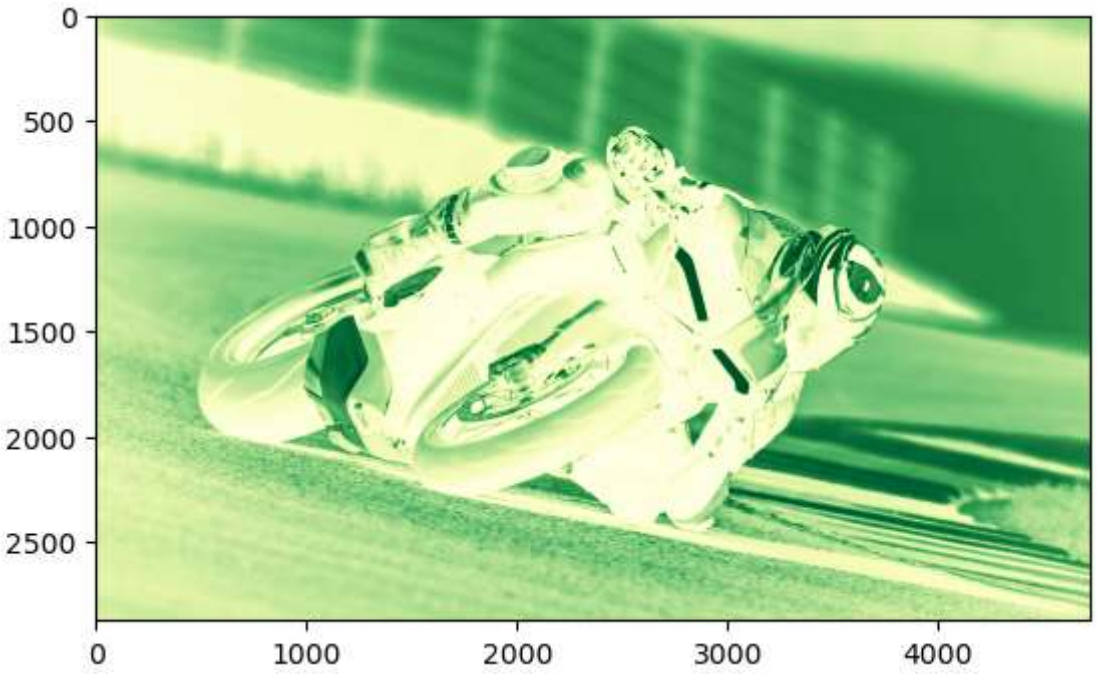
In [82]:
```
bike_red[:,:,0]
```

Out[82]:
```
array([[ 58,  61,  62, ..., 104, 103, 104],
       [ 61,  60,  59, ..., 103, 104, 104],
       [ 62,  59,  58, ..., 103, 105, 105],
       ...,
       [ 61,  60,  60, ...,  32,  31,  34],
       [ 60,  59,  60, ...,  27,  27,  28],
       [ 59,  59,  61, ...,  25,  25,  26]], dtype=uint8)
```

In [96]:
```
plt.imshow(bike_red[:,:,0],cmap='Greys')
plt.show()
```



In [98]:
```
plt.imshow(bike_red[:,:,1],cmap='YlGn')
plt.show()
```



In [100…
```
bike_red[:,:,0]
```

Out[100…
```
array([[ 58,  61,  62, ..., 104, 103, 104],
       [ 61,  60,  59, ..., 103, 104, 104],
       [ 62,  59,  58, ..., 103, 105, 105],
       ...,
       [ 61,  60,  60, ...,  32,  31,  34],
       [ 60,  59,  60, ...,  27,  27,  28],
       [ 59,  59,  61, ...,  25,  25,  26]], dtype=uint8)
```

In [102…
```
bike_red[:,:,1]
```

Out[102…
```
array([[59, 62, 63, ..., 96, 95, 96],
       [62, 61, 60, ..., 95, 96, 96],
       [63, 60, 59, ..., 95, 97, 97],
       ...,
       [59, 58, 58, ..., 32, 31, 34],
       [58, 57, 58, ..., 27, 27, 28],
       [57, 57, 59, ..., 25, 25, 26]], dtype=uint8)
```

In [104…
```
bike_red[:,:,2]
```

Out[104…
```
array([[63, 66, 67, ..., 77, 76, 77],
       [66, 65, 64, ..., 76, 77, 77],
       [67, 64, 63, ..., 76, 78, 78],
       ...,
       [60, 59, 59, ..., 32, 31, 34],
       [59, 58, 59, ..., 27, 27, 28],
       [58, 58, 60, ..., 25, 25, 26]], dtype=uint8)
```

In [106…
```
bike_red[:,:,1]=0
```

In [108…
```
bike_red[:,:,1]
```

Out[108…
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

In [114…
```
plt.imshow(bike_red)
plt.show()
```

In [116…
```
bike_red[:,:,2]
```

Out[116…
```
array([[63, 66, 67, ..., 77, 76, 77],
       [66, 65, 64, ..., 76, 77, 77],
       [67, 64, 63, ..., 76, 78, 78],
       ...,
       [60, 59, 59, ..., 32, 31, 34],
       [59, 58, 59, ..., 27, 27, 28],
       [58, 58, 60, ..., 25, 25, 26]], dtype=uint8)
```

In [118…
```
bike_red[:,:,1]=0
```

In [120…
```
bike_red[:,:,1]
```

Out[120…
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

In [124…
```
plt.imshow(bike_red)
plt.show()
```

In [126…
```
bike_red[:,:,2]
```

Out[126…
```
array([[63, 66, 67, ..., 77, 76, 77],
       [66, 65, 64, ..., 76, 77, 77],
       [67, 64, 63, ..., 76, 78, 78],
       ...,
       [60, 59, 59, ..., 32, 31, 34],
       [59, 58, 59, ..., 27, 27, 28],
       [58, 58, 60, ..., 25, 25, 26]], dtype=uint8)
```

In [132…
```
plt.imshow(bike_red)
plt.show()
```

In [134…
```
bike_red
```

Out[134…
```
array([[[ 58,   0,  63],
        [ 61,   0,  66],
        [ 62,   0,  67],
        ...,
        [104,   0,  77],
        [103,   0,  76],
        [104,   0,  77]],

       [[ 61,   0,  66],
        [ 60,   0,  65],
        [ 59,   0,  64],
        ...,
        [103,   0,  76],
        [104,   0,  77],
        [104,   0,  77]],

       [[ 62,   0,  67],
        [ 59,   0,  64],
        [ 58,   0,  63],
        ...,
        [103,   0,  76],
        [105,   0,  78],
        [105,   0,  78]],

       ...,

       [[ 61,   0,  60],
        [ 60,   0,  59],
        [ 60,   0,  59],
        ...,
        [ 32,   0,  32],
        [ 31,   0,  31],
        [ 34,   0,  34]],

       [[ 60,   0,  59],
        [ 59,   0,  58],
        [ 60,   0,  59],
        ...,
        [ 27,   0,  27],
        [ 27,   0,  27],
        [ 28,   0,  28]],

       [[ 59,   0,  58],
        [ 59,   0,  58],
        [ 61,   0,  60],
        ...,
        [ 25,   0,  25],
        [ 25,   0,  25],
        [ 26,   0,  26]]], dtype=uint8)
```

In [136…
```
bike_arr
```

Out[136…

```
array([[[ 58,  59,  63],
        [ 61,  62,  66],
        [ 62,  63,  67],
        ...,
        [104,  96,  77],
        [103,  95,  76],
        [104,  96,  77]],

       [[ 61,  62,  66],
        [ 60,  61,  65],
        [ 59,  60,  64],
        ...,
        [103,  95,  76],
        [104,  96,  77],
        [104,  96,  77]],

       [[ 62,  63,  67],
        [ 59,  60,  64],
        [ 58,  59,  63],
        ...,
        [103,  95,  76],
        [105,  97,  78],
        [105,  97,  78]],

       ...,

       [[ 61,  59,  60],
        [ 60,  58,  59],
        [ 60,  58,  59],
        ...,
        [ 32,  32,  32],
        [ 31,  31,  31],
        [ 34,  34,  34]],

       [[ 60,  58,  59],
        [ 59,  57,  58],
        [ 60,  58,  59],
        ...,
        [ 27,  27,  27],
        [ 27,  27,  27],
        [ 28,  28,  28]],

       [[ 59,  57,  58],
        [ 59,  57,  58],
        [ 61,  59,  60],
        ...,
        [ 25,  25,  25],
        [ 25,  25,  25],
        [ 26,  26,  26]]], dtype=uint8)
```

In [138…

```
bike
```

Out[138…

In [142…
```
arr1=np.asarray(bike)
```

In [146…
```
type(arr1)
```

Out[146… numpy.ndarray

In [154…
```
plt.imshow(arr1)
plt.show()
```

In [158…
```
bike1=arr1.copy()
```

In [160…
```
bike1[:,:,0]=0
```

In [162…
```
plt.imshow(bike1)
plt.show()
```

In [164…
```
bike1[:,:,1]
```

Out[164…
```
array([[59, 62, 63, ..., 96, 95, 96],
       [62, 61, 60, ..., 95, 96, 96],
       [63, 60, 59, ..., 95, 97, 97],
       ...,
       [59, 58, 58, ..., 32, 31, 34],
       [58, 57, 58, ..., 27, 27, 28],
       [57, 57, 59, ..., 25, 25, 26]], dtype=uint8)
```

In [166…
```
bike1[:,:,1]=0
```

In [168…
```
plt.imshow(bike1)
plt.show()
```


0
500
1000
1500
2000
2500
0
1000
2000
3000
4000