PIL, NP, PLT

distplot - distribution plot -- distribuion is propert from statistic sns - is calleed statistical visualization univariate analysis - plot the graph using 1 variable is called univariate analysis plot - distplot & diplot bivariate anlaysis - plot the graph using 2 variable is called bivariate anlaysis boxplot multivariate anlaysis - plot the graph using morethen 2 variable is multivariatea analysis
heatmap, facetgrid, pairplot outlier == anomaly detection

statistic outlier is the datapoint which is very far from other observatoion outlier will impact more on machine learning algorithms

how to detect outlier ? using visulization lmplot -- linear model plot legend() - numpy hue() - work in pandas

> importing data into python

2> Dataframe via panda 3> exploring datasets: head()tail()info()describe() 4> Renaming columns 5> subsetting dataframes 6> Basic operations with dataframe 8> filtering data frames 9> seaborn introduction -- .distplot | .boxplot | .lmplot(fit_reg) | outlier | hue parameter 10> univariate | bivariate | multivariate analysis

pil - python imagin library Image - 0-255 pixel image -- store in the form of array 2d chaneel - black & white 3d channel - rgb (red,green,blue)

matplotlib colormap details -->
https://matplotlib.org/stable/users/explain/colors/colormaps.html

how image will convert to array (np, plt, pil) when pixel values are changes -- array
manipulation happend) image also varies power goes numpy, matplotlib, pil library

```
In [1]: import numpy as np
```

```
In [3]: ones_arr = np.ones((3,3))
```

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

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

```
In [7]: ones_arr = np.ones((5,5),dtype=int)
```

```
In [9]: ones_arr
```

```
Out[9]: 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 [11]: zeros_arr = np.zeros((3,3), dtype = int)
```

```
In [13]: zeros_arr
```

```
Out[13]: array([[0, 0, 0],
                [0, 0, 0],
                [0, 0, 0]])
```

```
In [15]: ones_arr * 255
```

```
Out[15]: 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 [17]: import matplotlib.pyplot as plt
```

```
In [19]: %matplotlib inline
```

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

```
In [27]: picsart_img =Image.open(r'E:\Data Science & AI\Dataset files\Picsart.jpg')
```

```
In [29]: picsart_img
```

Out[29]:

In [33]: `type(picsart_img)`

Out[33]: `PIL.JpegImagePlugin.JpegImageFile`

In [35]:
```python
picsart_arr =np.asarray(picsart_img)
picsart_arr
```

```
Out[35]: 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, 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, 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],
                  [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, 1, 1],
                  [1, 1, 1],
                  [1, 1, 1]]], dtype=uint8)
```
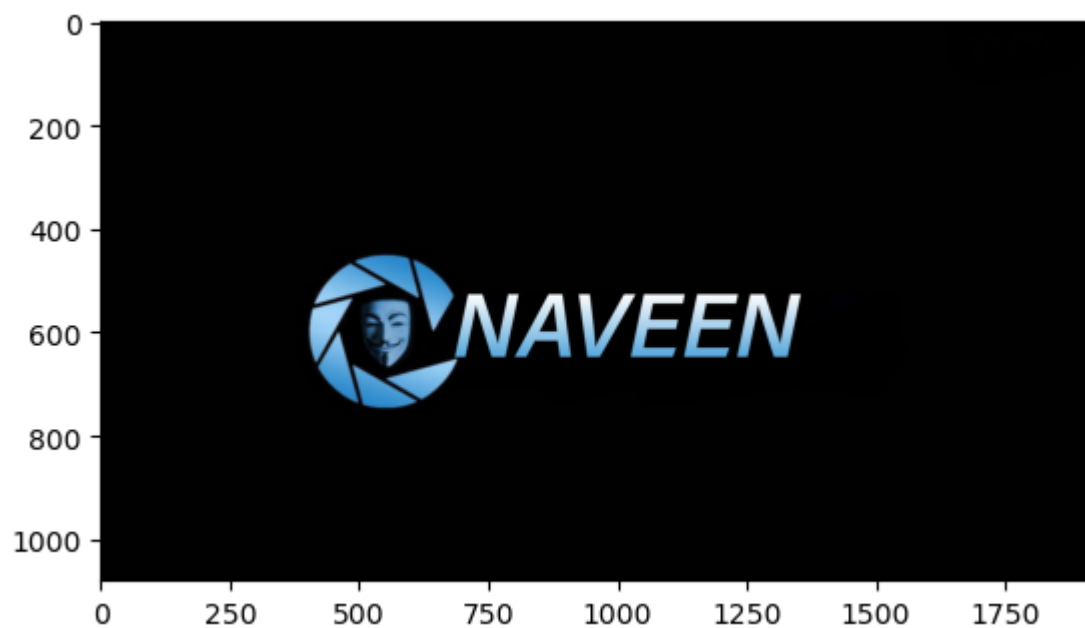
```
In [37]: type(picsart_arr)
```

```
Out[37]: numpy.ndarray
```

```
In [41]: picsart_arr.shape
```

```
Out[41]: (1080, 1921, 3)
```

```
In [43]: plt.imshow(picsart_arr)
```

Out[43]: <matplotlib.image.AxesImage at 0x1ec27c41be0>

In [39]: `picsart_arr.shape`

Out[39]: (1080, 1921, 3)

In [49]: `picsart_red = picsart_arr.copy()`

In [51]: `picsart_red`

```
Out[51]:  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, 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, 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],
                 [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, 1, 1],
                 [1, 1, 1],
                 [1, 1, 1]]], dtype=uint8)
```

```python
In [55]: picsart_arr == picsart_red
```

```
Out[55]:  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]]])
```
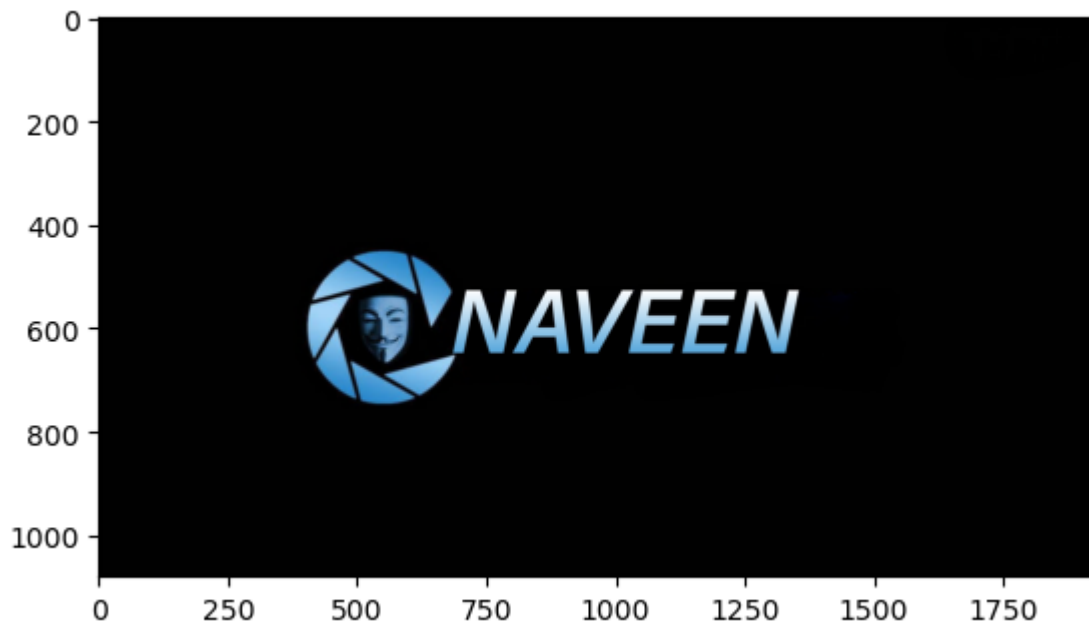
```
In [57]:  plt.imshow(picsart_red)
```

```
Out[57]:  <matplotlib.image.AxesImage at 0x1ec27cc0860>
```

```
In [59]: picsart_red.shape
```
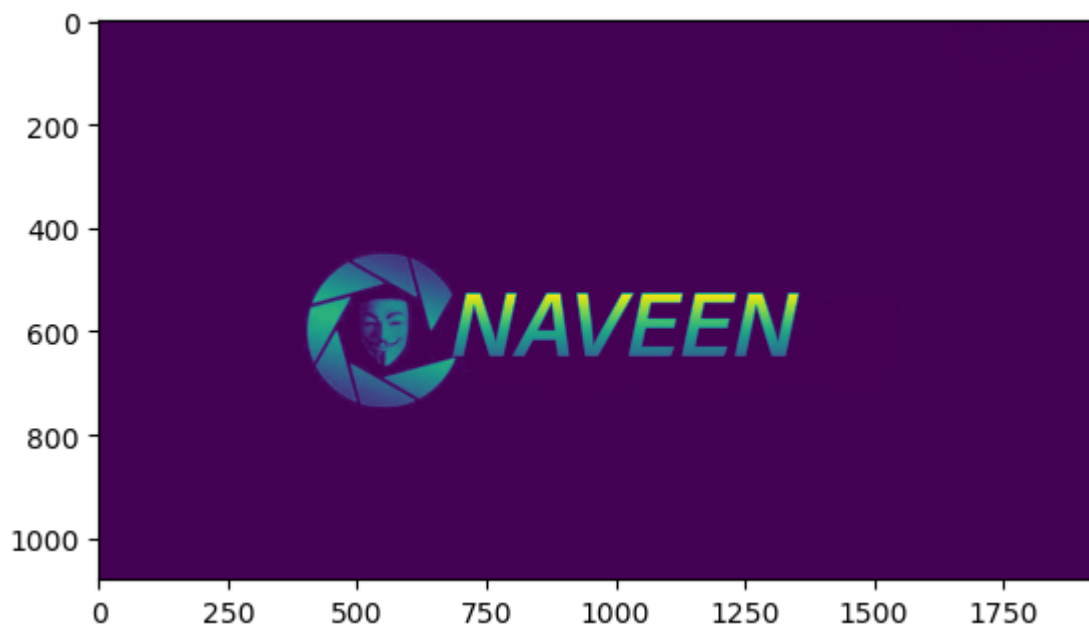
```
Out[59]: (1080, 1921, 3)
```

```
In [61]: # R G B
         plt.imshow(picsart_red[:,:,0])
```

```
Out[61]: <matplotlib.image.AxesImage at 0x1ec2a33f4a0>
```



```
In [63]: picsart_red[:,:,0]
```
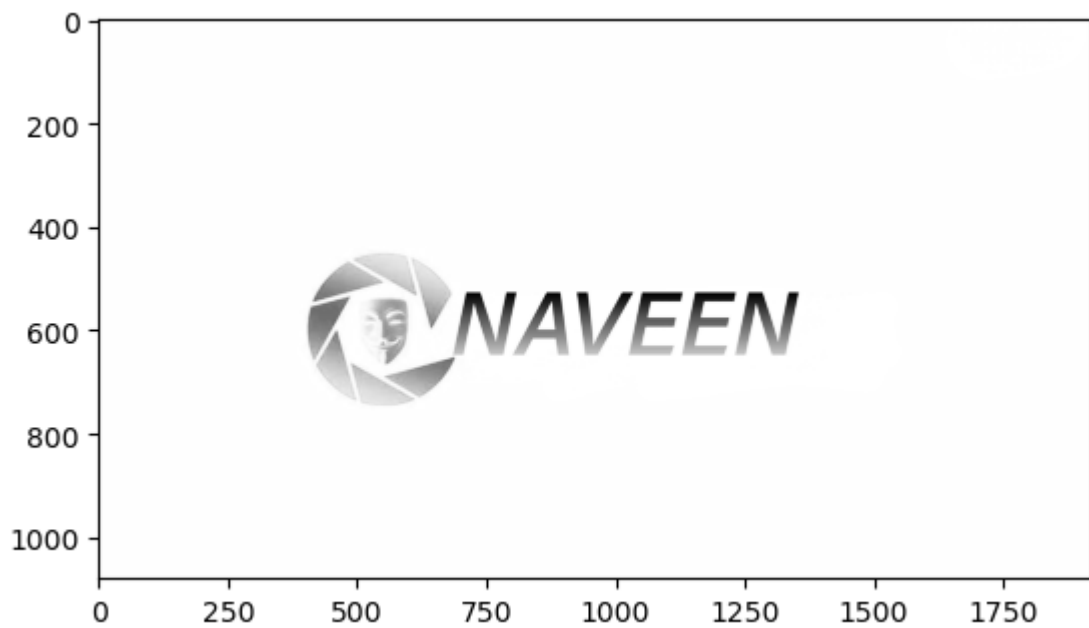
```
Out[63]: array([[1, 1, 1, ..., 1, 1, 1],
               [1, 1, 1, ..., 1, 1, 1],
               [1, 1, 1, ..., 1, 1, 1],
               ...,
               [1, 1, 1, ..., 1, 1, 1],
               [1, 1, 1, ..., 1, 1, 1],
               [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```
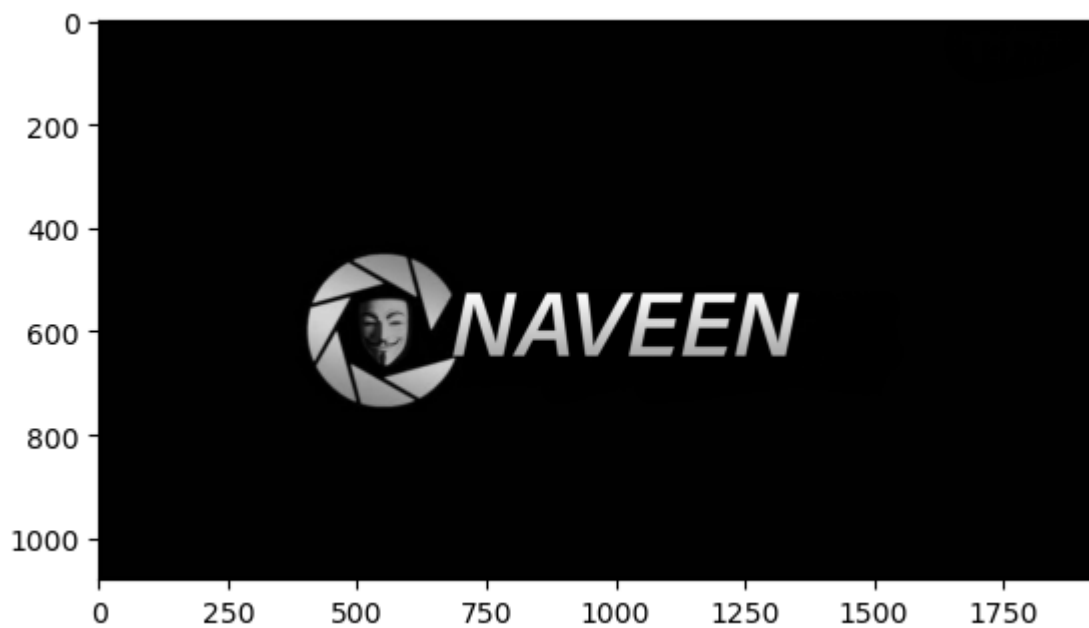
```
In [65]: plt.imshow(picsart_red[:,:,0], cmap='Greys')
```
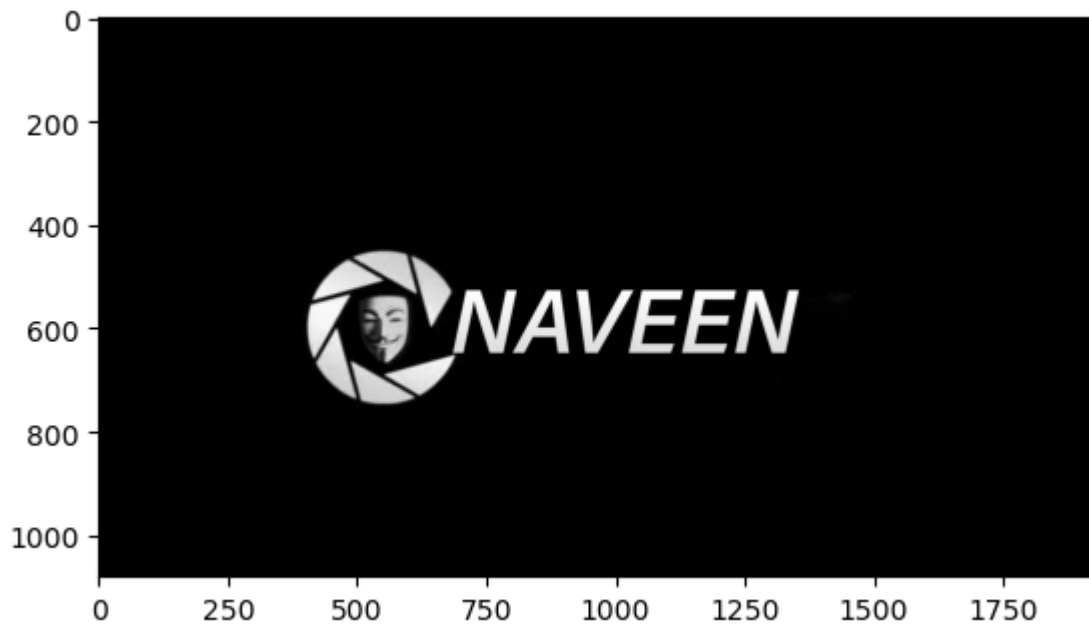
Out[65]: <matplotlib.image.AxesImage at 0x1ec2a36a660>


```
In [67]: plt.imshow(picsart_red[:,:,1], cmap='grey')
```

Out[67]: <matplotlib.image.AxesImage at 0x1ec2a33e9c0>


```
In [69]: plt.imshow(picsart_red[:,:,2], cmap='grey')
```

Out[69]: <matplotlib.image.AxesImage at 0x1ec2be93410>

```
In [73]:  picsart_red[:,:,0]
```

```
Out[73]:  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, 1, 1, ..., 1, 1, 1],
                 [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```

```
In [75]:  picsart_red[:,:,1]
```

```
Out[75]:  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, 1, 1, ..., 1, 1, 1],
                 [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```

```
In [77]:  picsart_red[:,:,2]
```

```
Out[77]:  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, 1, 1, ..., 1, 1, 1],
                 [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```
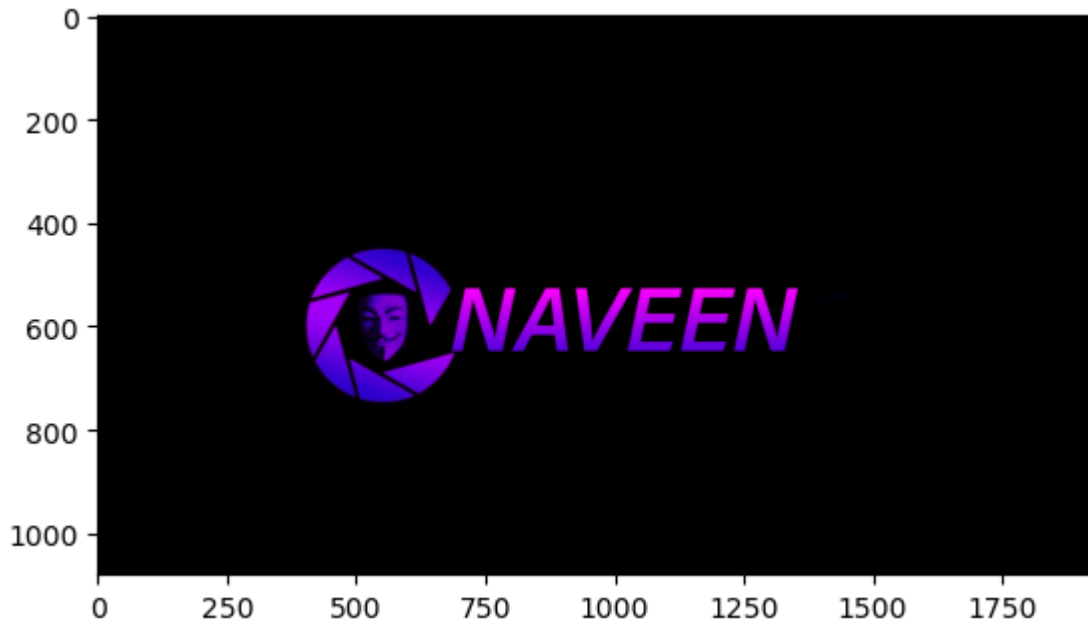
```
In [79]:  picsart_red[:,:,1]=0
```

```
In [81]:  picsart_red[:,:,1]
```

```
Out[81]:  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 [83]:  plt.imshow(picsart_red)
```

```
Out[83]:  <matplotlib.image.AxesImage at 0x1ec2c639a90>
```



```
In [85]:  picsart_red[:,:,2]
```

```
Out[85]:  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, 1, 1, ..., 1, 1, 1],
                 [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```
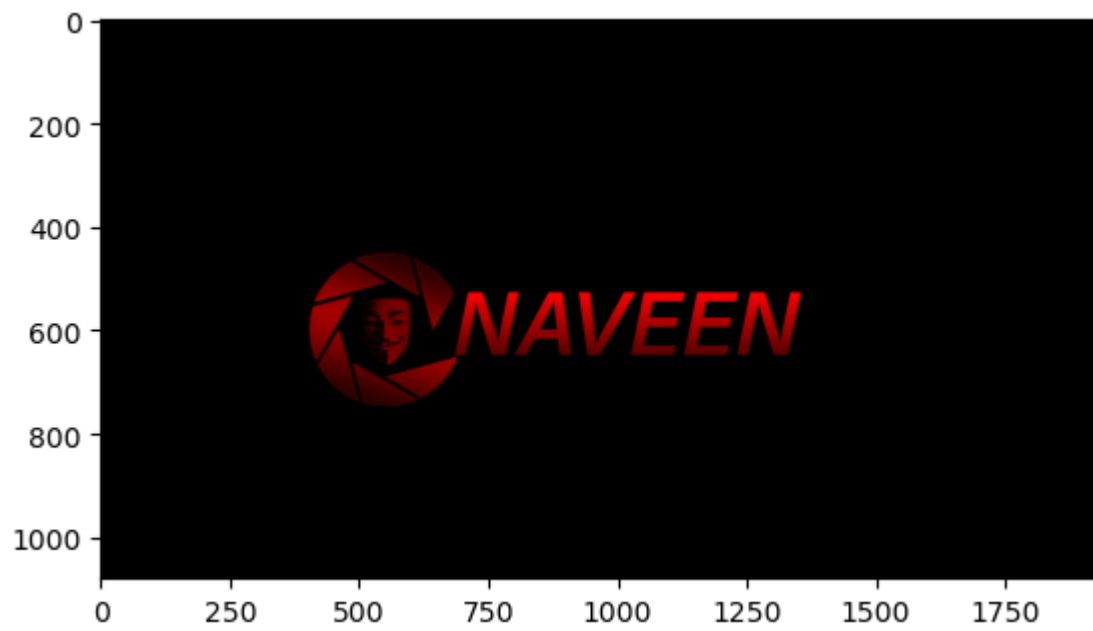
```
In [87]:  picsart_red[:,:,2]=0
```

```
In [89]:  picsart_red[:,:,2]
```

```
Out[89]:  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 [91]:  plt.imshow(picsart_red)
```

```
Out[91]:  <matplotlib.image.AxesImage at 0x1ec27bd7590>
```

In [95]: `picsart_arr`

```
Out[95]: 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, 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, 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],
                 [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, 1, 1],
                 [1, 1, 1],
                 [1, 1, 1]]], dtype=uint8)

In [97]: picsart_red
```

```
Out[97]:  array([[[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]],

                [[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]],

                [[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]],

                ...,

                [[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]],

                [[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]],

                [[1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0],
                 ...,
                 [1, 0, 0],
                 [1, 0, 0],
                 [1, 0, 0]]], dtype=uint8)

In [99]:  picsart_img
```

```
In [101...   arr1 = np.asarray(picsart_img)

In [103...   type(arr1)

Out[103...   numpy.ndarray

In [105...   arr1.shape

Out[105...   (1080, 1921, 3)

In [109...   plt.imshow(arr1)

Out[109...   <matplotlib.image.AxesImage at 0x1ec2c50cbc0>
```
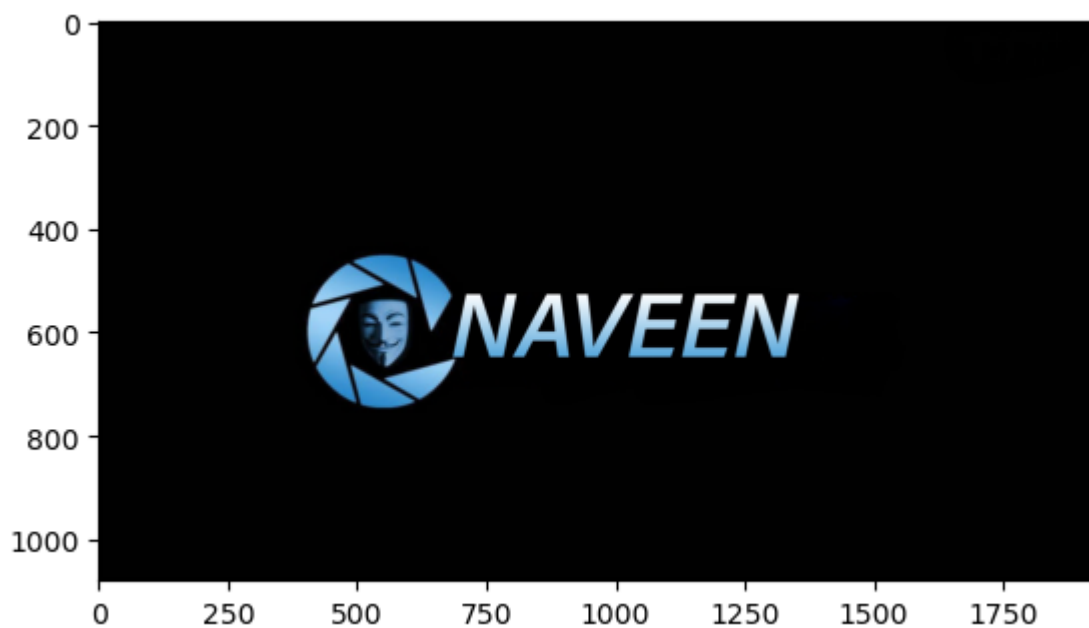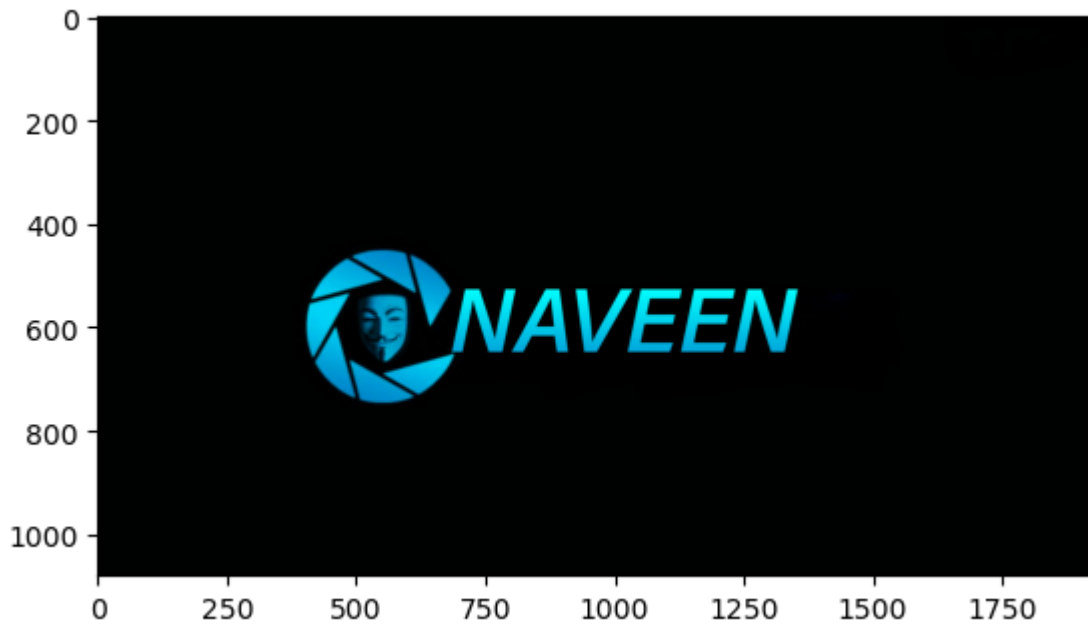


```
In [111...   picsart_img1=arr1.copy()

In [113...   picsart_img1[:,:,0]=0
```

```
In [115…   plt.imshow(picsart_img1)
```

Out[115…   <matplotlib.image.AxesImage at 0x1ec2c545a30>


```
In [117…   picsart_img1[:,:,1]
```
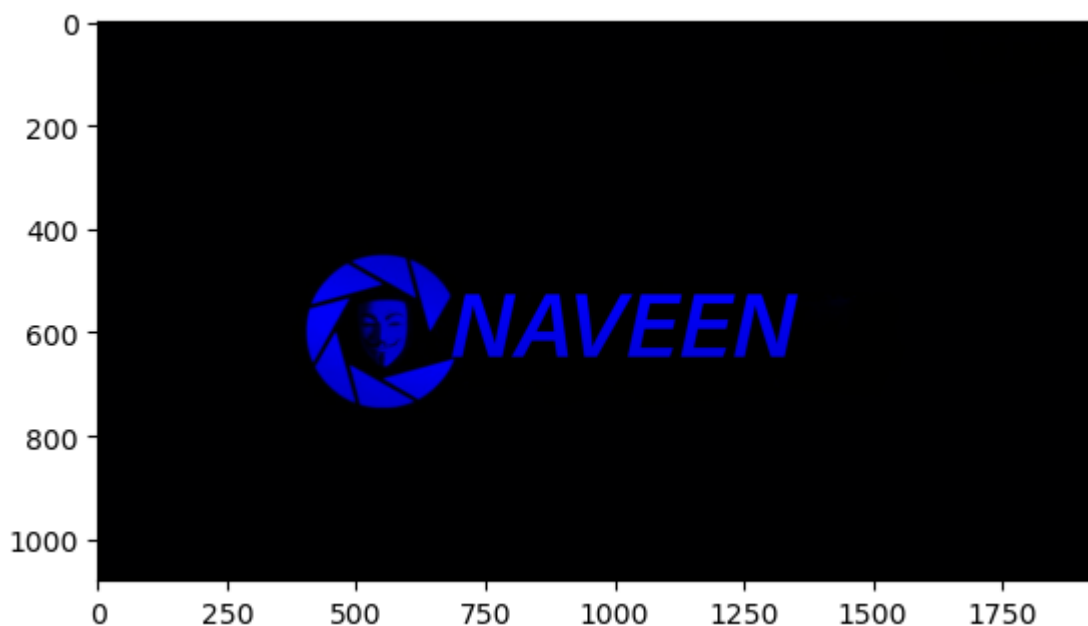
Out[117…   array([[1, 1, 1, ..., 1, 1, 1],
              [1, 1, 1, ..., 1, 1, 1],
              [1, 1, 1, ..., 1, 1, 1],
              ...,
              [1, 1, 1, ..., 1, 1, 1],
              [1, 1, 1, ..., 1, 1, 1],
              [1, 1, 1, ..., 1, 1, 1]], dtype=uint8)
```

```
In [119…   picsart_img1[:,:,1]=0
```

```
In [121…   plt.imshow(picsart_img1)
```

Out[121…   <matplotlib.image.AxesImage at 0x1ec2ec56ea0>

NUMPY WORK-checkpoint

1. ...

```
In [123... import numpy as np
```

```
In [125... import numpy as np
arr = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12]) # THIS IS 1D ARRAY
newarr1 = arr.reshape(2, 3, 2) # WITH RESHAPE FUNCTION NOW CONVERTED IT INTO 3D
newarr2 = arr.reshape(4,3) # WITH RESHAPE FUNCTION NOW CONVERTED IT INTO 2D ARRA
print(newarr1)
print(newarr2)
```

```
[[[ 1  2]
  [ 3  4]
  [ 5  6]]

 [[ 7  8]
  [ 9 10]
  [11 12]]]
[[ 1  2  3]
 [ 4  5  6]
 [ 7  8  9]
 [10 11 12]]
```

```
In [127... newarr1
```

```
Out[127... array([[[ 1,  2],
         [ 3,  4],
         [ 5,  6]],

        [[ 7,  8],
         [ 9, 10],
         [11, 12]]])
```

```
In [129... newarr1 = [...,2]
print(newarr1)
```

```
[Ellipsis, 2]
```

```
In [131... newarr1 =[1,...]
print(newarr1)
```

```
[1, Ellipsis]
```

2. []

```
In [135... import numpy as np
b = np.arange(0,20)
print(b)
```

```
[ 0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19]
```

```
In [137... b1 = np.reshape(b,(5,4))
print(b1)
```