Image Conversion for matrix visualization mini project

```python
In [1]: import numpy as np
        import matplotlib.pyplot as plt
```
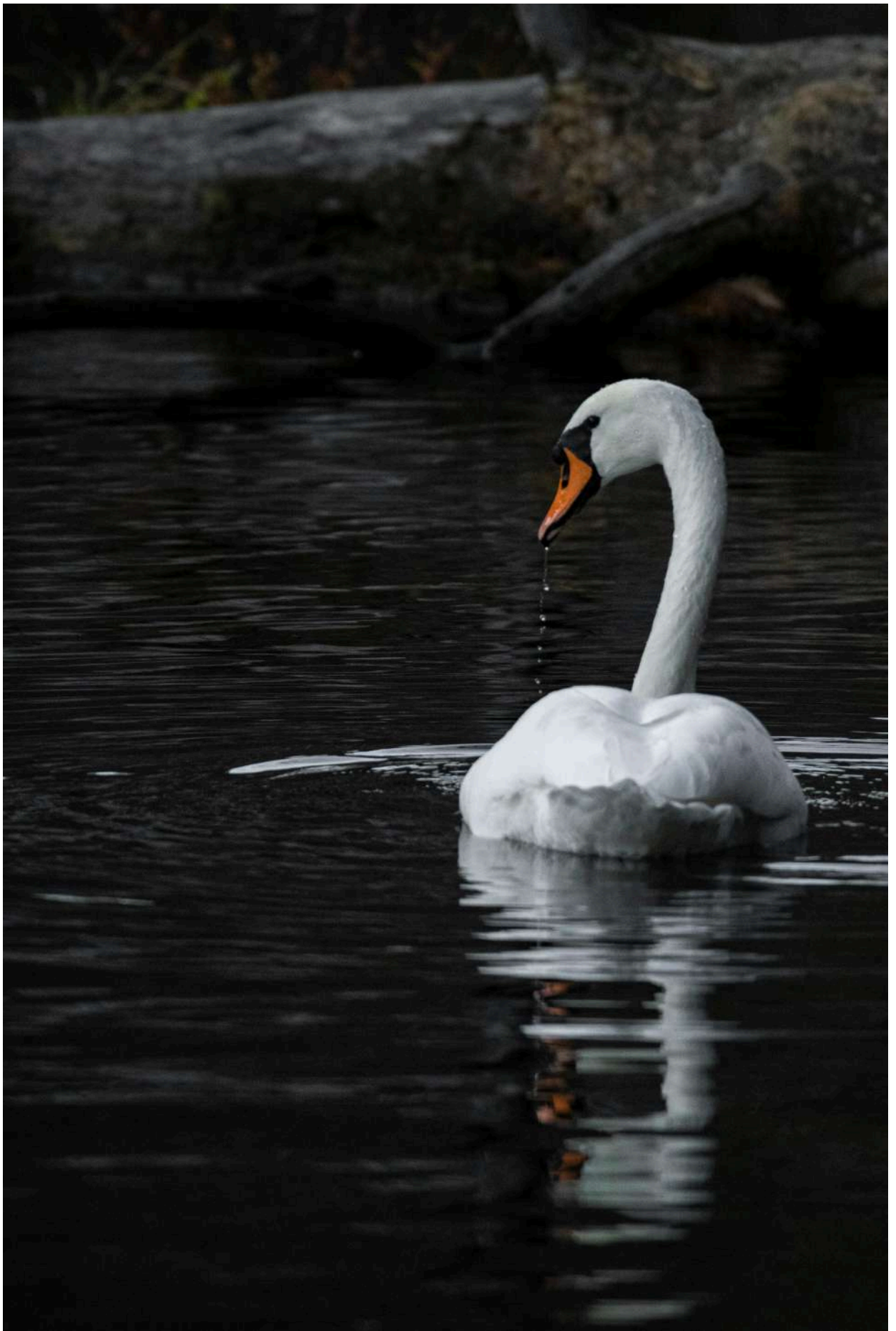
```python
In [2]: %matplotlib inline
```

```python
In [3]: from PIL import Image
```

```python
In [4]: Swan = Image.open(r"C:\Users\ratho\Downloads\Swan.jpg")   # loading the image
```

```python
In [5]: Swan
```

`type(Swan)   # type of image`

```
Out[6]:    PIL.JpegImagePlugin.JpegImageFile

In [7]:    Swan_arr = np.asarray(Swan)      # converting the image to array
           Swan_arr

Out[7]:    array([[[  0,   0,   0],
                  [  3,   3,   1],
                  [  8,   8,   6],
                  ...,
                  [ 22,  23,  18],
                  [ 27,  28,  23],
                  [ 28,  29,  24]],

                 [[  3,   3,   1],
                  [  5,   5,   3],
                  [  7,   7,   5],
                  ...,
                  [ 34,  35,  30],
                  [ 37,  38,  33],
                  [ 34,  35,  30]],

                 [[  8,   8,   6],
                  [  6,   6,   4],
                  [  5,   5,   3],
                  ...,
                  [ 31,  32,  27],
                  [ 28,  29,  24],
                  [ 20,  21,  16]],

                 ...,

                 [[  8,   8,   8],
                  [  8,   8,   8],
                  [  8,   8,   8],
                  ...,
                  [ 10,  11,   6],
                  [ 10,  11,   6],
                  [ 11,  12,   7]],

                 [[ 10,  10,  10],
                  [ 11,  11,  11],
                  [ 12,  12,  12],
                  ...,
                  [  9,  10,   5],
                  [  8,   9,   4],
                  [  8,   9,   4]],

                 [[ 11,  11,  11],
                  [ 13,  13,  13],
                  [ 16,  16,  16],
                  ...,
                  [ 10,  11,   6],
                  [ 10,  11,   6],
                  [  9,  10,   5]]], dtype=uint8)

In [8]:    type(Swan_arr)      # check the type of array

Out[8]:    numpy.ndarray
```
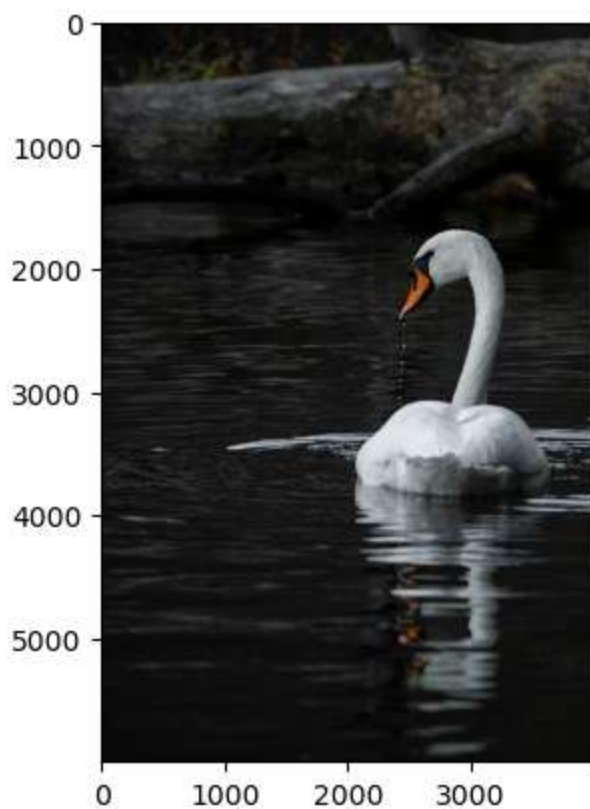
```
In [9]:   plt.imshow(Swan_arr)      # show dimention of the image
```

Out[9]:   <matplotlib.image.AxesImage at 0x2328480ddb0>


```
In [16]:  Swan_arr.shape     # shape of image
```

Out[16]: (6000, 4000, 3)

```
In [10]:  Swan_red = Swan_arr.copy()
          Swan_red
```

```
Out[10]:  array([[[ 0,  0,  0],
                 [ 3,  3,  1],
                 [ 8,  8,  6],
                 ...,
                 [22, 23, 18],
                 [27, 28, 23],
                 [28, 29, 24]],

                [[ 3,  3,  1],
                 [ 5,  5,  3],
                 [ 7,  7,  5],
                 ...,
                 [34, 35, 30],
                 [37, 38, 33],
                 [34, 35, 30]],

                [[ 8,  8,  6],
                 [ 6,  6,  4],
                 [ 5,  5,  3],
                 ...,
                 [31, 32, 27],
                 [28, 29, 24],
                 [20, 21, 16]],

                ...,

                [[ 8,  8,  8],
                 [ 8,  8,  8],
                 [ 8,  8,  8],
                 ...,
                 [10, 11,  6],
                 [10, 11,  6],
                 [11, 12,  7]],

                [[10, 10, 10],
                 [11, 11, 11],
                 [12, 12, 12],
                 ...,
                 [ 9, 10,  5],
                 [ 8,  9,  4],
                 [ 8,  9,  4]],

                [[11, 11, 11],
                 [13, 13, 13],
                 [16, 16, 16],
                 ...,
                 [10, 11,  6],
                 [10, 11,  6],
                 [ 9, 10,  5]]], dtype=uint8)
```

In [11]: `Swan_red == Swan_arr`

```
Out[11]: 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]]])
```
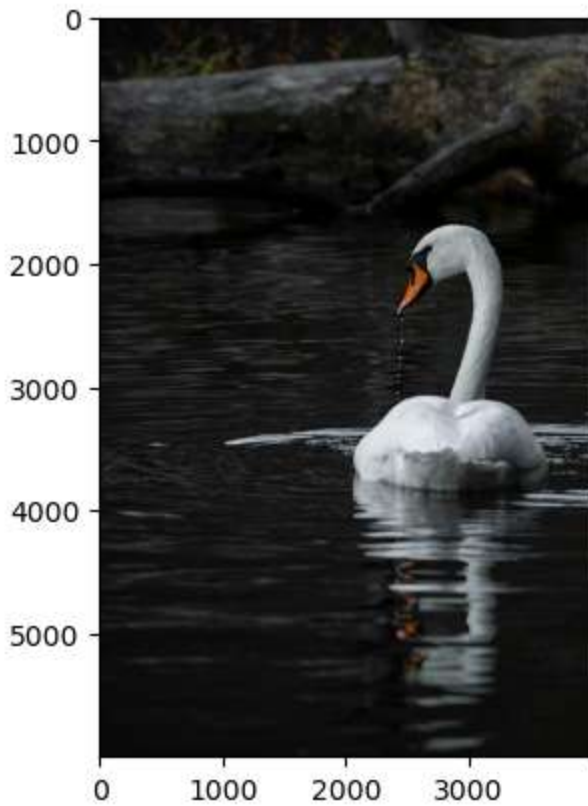
In [12]: `plt.imshow(Swan_red)`

Out[12]: `<matplotlib.image.AxesImage at 0x2328882dd50>`

In [13]: Swan_red.shape

Out[13]: (6000, 4000, 3)

In [60]:
```python
plt.imshow(Swan_red[:,:,0])

# this function use for displaying 2D array
# visualize array data into image

#      > (Swan_red) is an array of Swan image
#      > ((Swan_red)[:,:,0]) represents image channel (red,blue,green)


# [:,:,0] is a slicing operation.
# In a 3D array,
#          - the first two dimensions (:) represent the height and width (or rows and
#          - third dimension (the last index) corresponds to color channels:
#                                                  0 refers to the red ch
#                                                  1 for Green channel
#                                                  2 for blue channel.


#  Hence, this (Swan_red[:,:,0]) command selects all the value from only red channel r
```

Out[60]: <matplotlib.image.AxesImage at 0x232ab22a710>
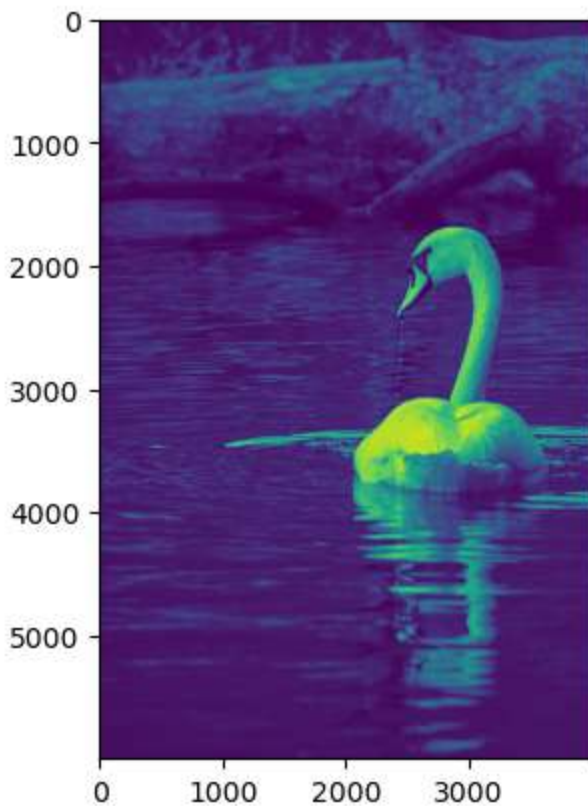
```
In [16]: Swan_red[:,:,0]
```

```
Out[16]: array([[ 0,  3,  8, ..., 22, 27, 28],
                [ 3,  5,  7, ..., 34, 37, 34],
                [ 8,  6,  5, ..., 31, 28, 20],
                ...,
                [ 8,  8,  8, ..., 10, 10, 11],
                [10, 11, 12, ...,  9,  8,  8],
                [11, 13, 16, ..., 10, 10,  9]], dtype=uint8)
```

```
In [69]: plt.imshow(Swan_red[:,:,0], cmap='Greys')

         # here this (Swan_red[:,:,0]) command selects all the value from only red channel repr
         # cmap = colourmap - [defines how the pixel values are mapped to colors.]


         #   The `'Greys'` colormap shows the red channel in shades of gray:
         #lower red intensity appears black, and higher intensity appears white.
         #This makes it easier to see variations in red intensity without the distraction of co
```
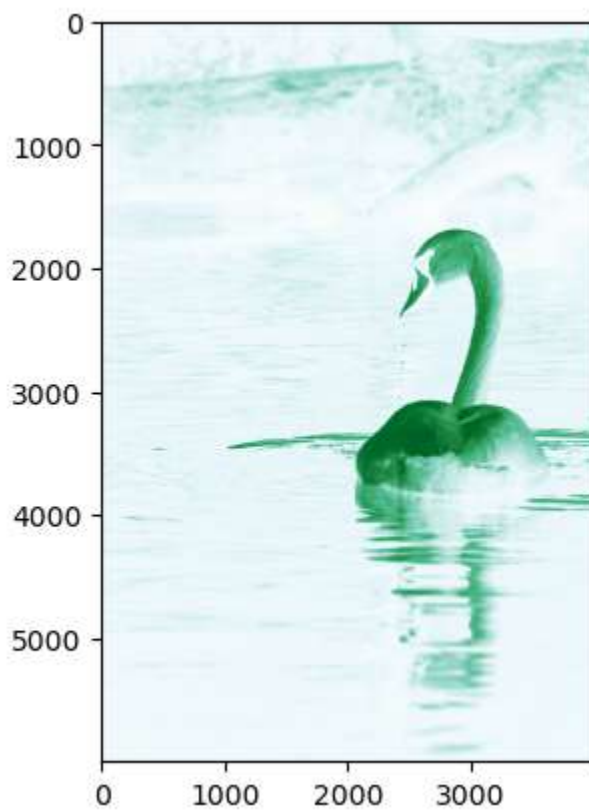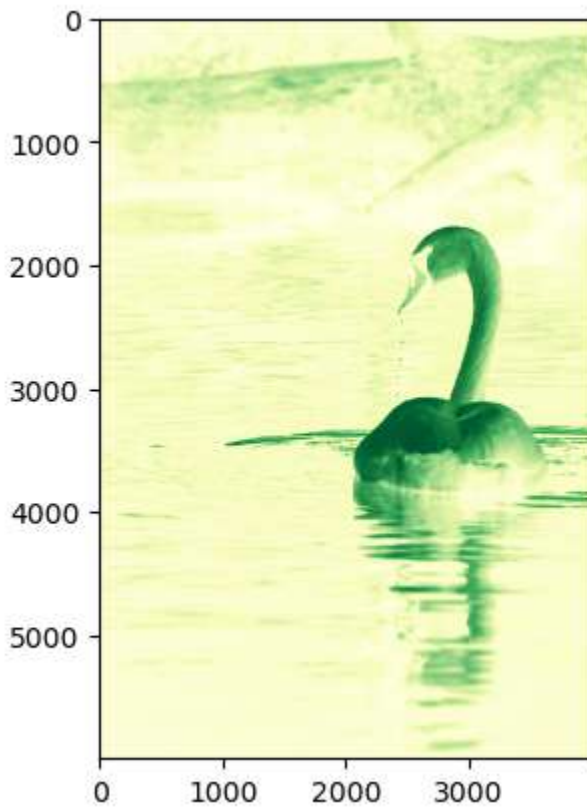
```
Out[69]: <matplotlib.image.AxesImage at 0x232de67f520>
```
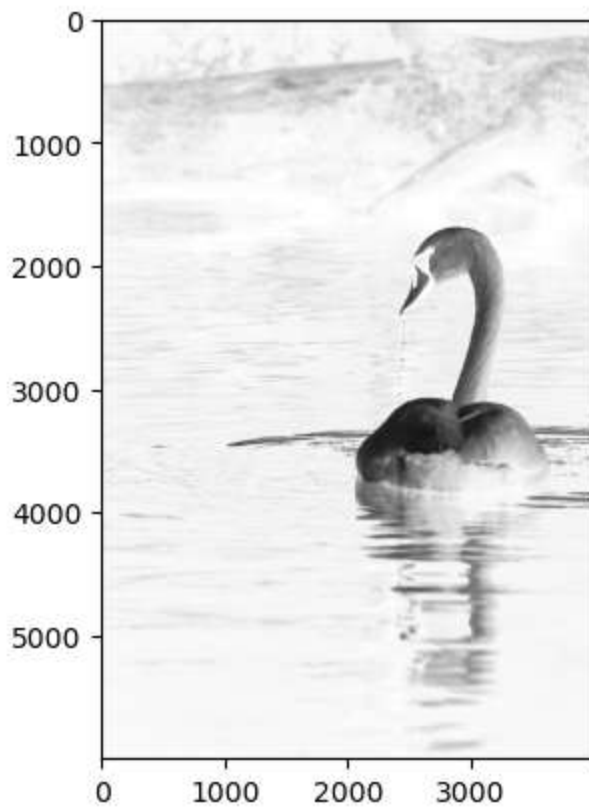
In [63]: `plt.imshow(Swan_red[:,:,0], cmap ='BuGn')`

Out[63]: `<matplotlib.image.AxesImage at 0x232db62f070>`

In [23]: `plt.imshow(Swan_red[:,:,1], cmap='YlGn')`

`<matplotlib.image.AxesImage at 0x232ab340850>`

In [24]: `Swan_red[:,:,0]`

Out[24]:
```
array([[ 0,  3,  8, ..., 22, 27, 28],
       [ 3,  5,  7, ..., 34, 37, 34],
       [ 8,  6,  5, ..., 31, 28, 20],
       ...,
       [ 8,  8,  8, ..., 10, 10, 11],
       [10, 11, 12, ...,  9,  8,  8],
       [11, 13, 16, ..., 10, 10,  9]], dtype=uint8)
```

In [25]: `Swan_red[:,:,1]`

Out[25]:
```
array([[ 0,  3,  8, ..., 23, 28, 29],
       [ 3,  5,  7, ..., 35, 38, 35],
       [ 8,  6,  5, ..., 32, 29, 21],
       ...,
       [ 8,  8,  8, ..., 11, 11, 12],
       [10, 11, 12, ..., 10,  9,  9],
       [11, 13, 16, ..., 11, 11, 10]], dtype=uint8)
```

In [26]: `Swan_red[:,:,2]`

Out[26]:
```
array([[ 0,  1,  6, ..., 18, 23, 24],
       [ 1,  3,  5, ..., 30, 33, 30],
       [ 6,  4,  3, ..., 27, 24, 16],
       ...,
       [ 8,  8,  8, ...,  6,  6,  7],
       [10, 11, 12, ...,  5,  4,  4],
       [11, 13, 16, ...,  6,  6,  5]], dtype=uint8)
```

In [28]:
```
Swan_red[:,:,1] = 0
Swan_red[:,:,1]
```

```
Out[28]:    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 [29]: `plt.imshow(Swan_red)`

Out[29]: `<matplotlib.image.AxesImage at 0x232ab3680a0>`

In [30]: `Swan_red[:,:,2]`

```
Out[30]:    array([[ 0,  1,  6, ..., 18, 23, 24],
               [ 1,  3,  5, ..., 30, 33, 30],
               [ 6,  4,  3, ..., 27, 24, 16],
               ...,
               [ 8,  8,  8, ...,  6,  6,  7],
               [10, 11, 12, ...,  5,  4,  4],
               [11, 13, 16, ...,  6,  6,  5]], dtype=uint8)
```

In [32]:
```
Swan_red[:,:,2]=0
Swan_red[:,:,2]
```

```
Out[32]:    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 [33]: `plt.imshow(Swan_red)`

`<matplotlib.image.AxesImage at 0x232ab3ca260>`

In [34]: `Swan_arr`

```
Out[34]:  array([[[ 0,  0,  0],
                  [ 3,  3,  1],
                  [ 8,  8,  6],
                  ...,
                  [22, 23, 18],
                  [27, 28, 23],
                  [28, 29, 24]],

                 [[ 3,  3,  1],
                  [ 5,  5,  3],
                  [ 7,  7,  5],
                  ...,
                  [34, 35, 30],
                  [37, 38, 33],
                  [34, 35, 30]],

                 [[ 8,  8,  6],
                  [ 6,  6,  4],
                  [ 5,  5,  3],
                  ...,
                  [31, 32, 27],
                  [28, 29, 24],
                  [20, 21, 16]],

                 ...,

                 [[ 8,  8,  8],
                  [ 8,  8,  8],
                  [ 8,  8,  8],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [11, 12,  7]],

                 [[10, 10, 10],
                  [11, 11, 11],
                  [12, 12, 12],
                  ...,
                  [ 9, 10,  5],
                  [ 8,  9,  4],
                  [ 8,  9,  4]],

                 [[11, 11, 11],
                  [13, 13, 13],
                  [16, 16, 16],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [ 9, 10,  5]]], dtype=uint8)
```

In [35]: Swan_red

```
Out[35]:   array([[[ 0,  0,  0],
                   [ 3,  0,  0],
                   [ 8,  0,  0],
                   ...,
                   [22,  0,  0],
                   [27,  0,  0],
                   [28,  0,  0]],

                  [[ 3,  0,  0],
                   [ 5,  0,  0],
                   [ 7,  0,  0],
                   ...,
                   [34,  0,  0],
                   [37,  0,  0],
                   [34,  0,  0]],

                  [[ 8,  0,  0],
                   [ 6,  0,  0],
                   [ 5,  0,  0],
                   ...,
                   [31,  0,  0],
                   [28,  0,  0],
                   [20,  0,  0]],

                  ...,

                  [[ 8,  0,  0],
                   [ 8,  0,  0],
                   [ 8,  0,  0],
                   ...,
                   [10,  0,  0],
                   [10,  0,  0],
                   [11,  0,  0]],

                  [[10,  0,  0],
                   [11,  0,  0],
                   [12,  0,  0],
                   ...,
                   [ 9,  0,  0],
                   [ 8,  0,  0],
                   [ 8,  0,  0]],

                  [[11,  0,  0],
                   [13,  0,  0],
                   [16,  0,  0],
                   ...,
                   [10,  0,  0],
                   [10,  0,  0],
                   [ 9,  0,  0]]], dtype=uint8)
```
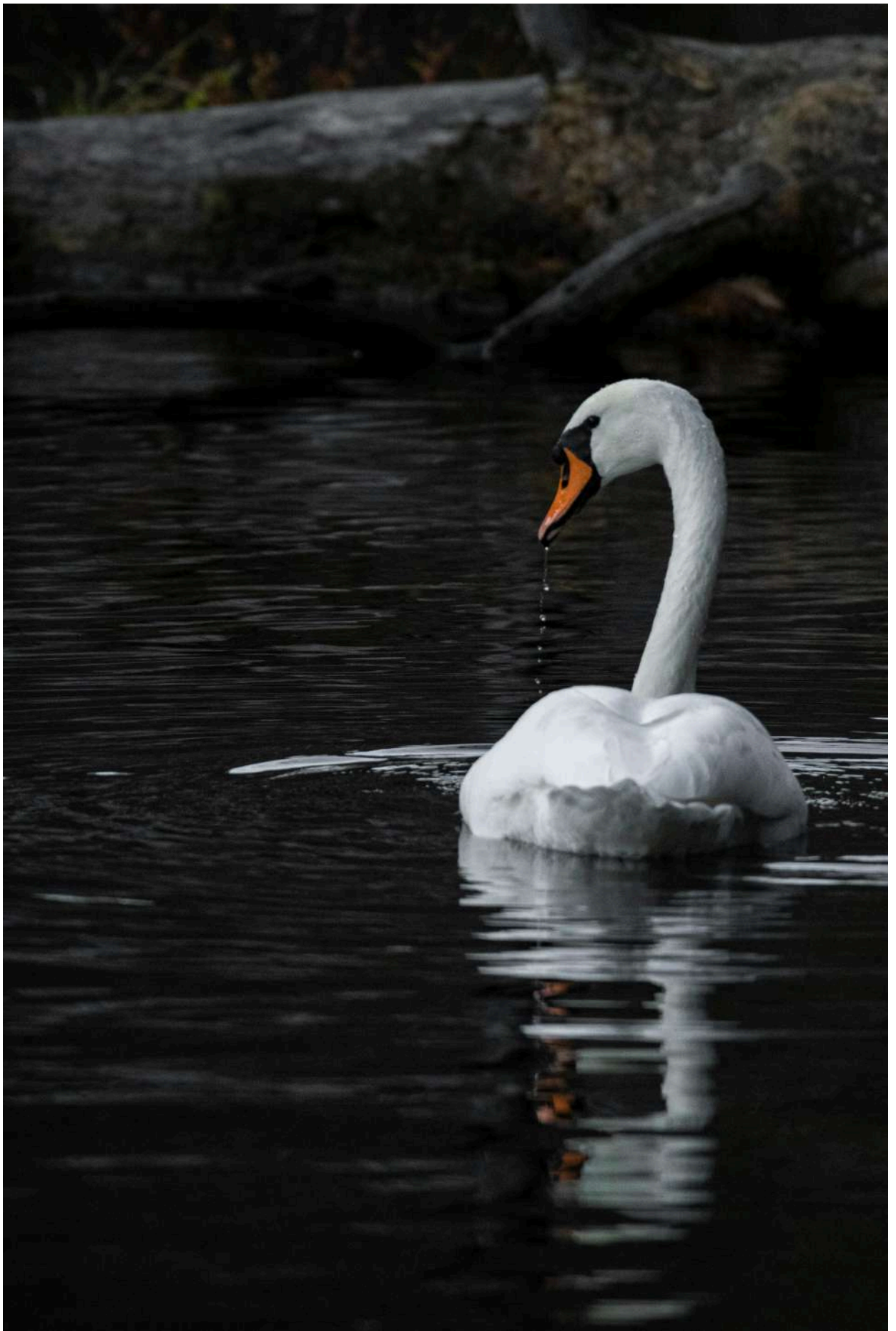
In [36]:   Swan

```
In [39]: arr1 = np.array(Swan)
         arr1
```

```
Out[39]: array([[[ 0,  0,  0],
                  [ 3,  3,  1],
                  [ 8,  8,  6],
                  ...,
                  [22, 23, 18],
                  [27, 28, 23],
                  [28, 29, 24]],

                 [[ 3,  3,  1],
                  [ 5,  5,  3],
                  [ 7,  7,  5],
                  ...,
                  [34, 35, 30],
                  [37, 38, 33],
                  [34, 35, 30]],

                 [[ 8,  8,  6],
                  [ 6,  6,  4],
                  [ 5,  5,  3],
                  ...,
                  [31, 32, 27],
                  [28, 29, 24],
                  [20, 21, 16]],

                 ...,

                 [[ 8,  8,  8],
                  [ 8,  8,  8],
                  [ 8,  8,  8],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [11, 12,  7]],

                 [[10, 10, 10],
                  [11, 11, 11],
                  [12, 12, 12],
                  ...,
                  [ 9, 10,  5],
                  [ 8,  9,  4],
                  [ 8,  9,  4]],

                 [[11, 11, 11],
                  [13, 13, 13],
                  [16, 16, 16],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [ 9, 10,  5]]], dtype=uint8)
```
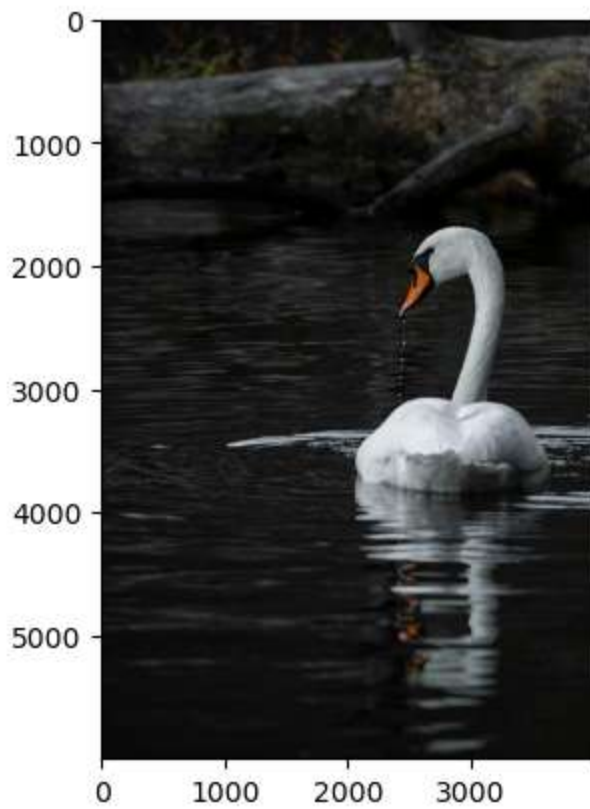
```
In [38]: type(arr1)
```

```
Out[38]: numpy.ndarray
```

```
In [40]: arr1.shape
```

(6000, 4000, 3)

In [41]:
```python
plt.imshow(arr1)
```

Out[41]: `<matplotlib.image.AxesImage at 0x232b5493070>`

In [43]:
```python
Swan_1 = arr1.copy()
Swan_1
```

```
Out[43]:  array([[[ 0,  0,  0],
                  [ 3,  3,  1],
                  [ 8,  8,  6],
                  ...,
                  [22, 23, 18],
                  [27, 28, 23],
                  [28, 29, 24]],

                 [[ 3,  3,  1],
                  [ 5,  5,  3],
                  [ 7,  7,  5],
                  ...,
                  [34, 35, 30],
                  [37, 38, 33],
                  [34, 35, 30]],

                 [[ 8,  8,  6],
                  [ 6,  6,  4],
                  [ 5,  5,  3],
                  ...,
                  [31, 32, 27],
                  [28, 29, 24],
                  [20, 21, 16]],

                 ...,

                 [[ 8,  8,  8],
                  [ 8,  8,  8],
                  [ 8,  8,  8],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [11, 12,  7]],

                 [[10, 10, 10],
                  [11, 11, 11],
                  [12, 12, 12],
                  ...,
                  [ 9, 10,  5],
                  [ 8,  9,  4],
                  [ 8,  9,  4]],

                 [[11, 11, 11],
                  [13, 13, 13],
                  [16, 16, 16],
                  ...,
                  [10, 11,  6],
                  [10, 11,  6],
                  [ 9, 10,  5]]], dtype=uint8)
```

In [44]: `Swan_1[:,:,0]=0`

In [45]: `plt.imshow(Swan_1)`

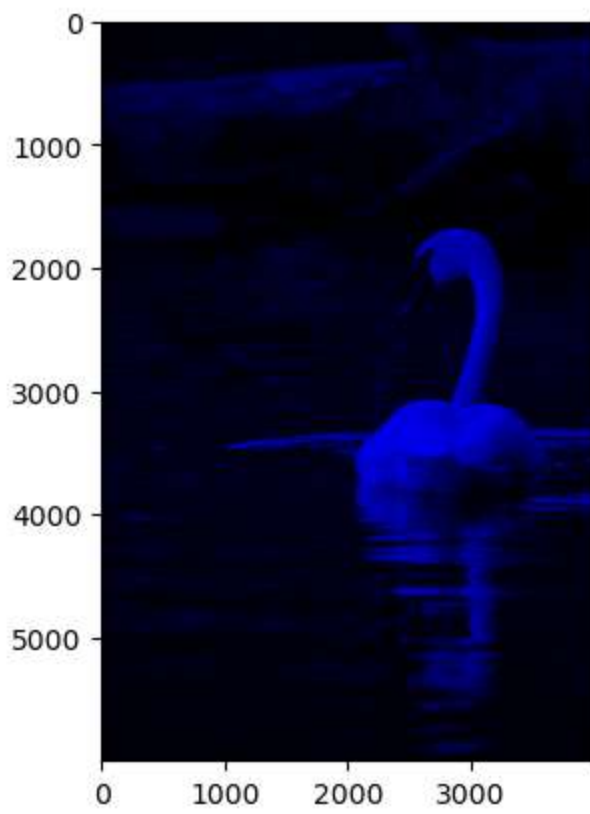Out[45]: `<matplotlib.image.AxesImage at 0x232b550eda0>`

In [46]: `Swan_1[:,:,1]`

Out[46]:
```
array([[ 0,  3,  8, ..., 23, 28, 29],
       [ 3,  5,  7, ..., 35, 38, 35],
       [ 8,  6,  5, ..., 32, 29, 21],
       ...,
       [ 8,  8,  8, ..., 11, 11, 12],
       [10, 11, 12, ..., 10,  9,  9],
       [11, 13, 16, ..., 11, 11, 10]], dtype=uint8)
```

In [47]: `Swan_1[:,:,1] = 0`

In [48]: `plt.imshow(Swan_1)`

Out[48]: `<matplotlib.image.AxesImage at 0x232b557aec0>`