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```python
import numpy as np
import cv2
import matplotlib.pyplot as plt
import os
```

```python
image_path="/content/download.jpg"
```

```python
img = cv2.imread(image_path)
```

Image Negative

```python
img_negative = 255 - img
img
```

ndarray (148, 205, 3) [show data]


```python
plt.imshow(img)
img
```

ndarray (148, 205, 3) [show data]

Contrast Stretching

```python
r_min = np.min(img)
r_max = np.max(img)
```

```python
i_min=0
i_max=255
```

```python
stretching_img = (img - r_min) / (i_max - i_min) * 255
```

```python
stretching_img
```

```
array([[[177.87804878, 134.34146341,  54.73170732],
        [179.12195122, 135.58536585,  55.97560976],
        [180.36585366, 136.82926829,  57.2195122 ],
        ...,
        [140.56097561,  97.02439024,  54.73170732],
        [141.80487805,  98.26829268,  57.2195122 ],
        [140.56097561,  98.26829268,  62.19512195]],

       [[180.36585366, 136.82926829,  57.2195122 ],
        [181.6097561 , 138.07317073,  58.46341463],
        [182.85365854, 139.31707317,  59.70731707],
        ...,
        [134.34146341,  97.02439024,  53.48780488],
        [135.58536585,  97.02439024,  55.97560976],
        [135.58536585,  99.51219512,  60.95121951]],

       [[186.58536585, 143.04878049,  63.43902439],
        [187.82926829, 144.29268293,  64.68292683],
        [187.82926829, 144.29268293,  64.68292683],
        ...,
        [129.36585366, 102.        ,  57.2195122 ],
        [131.85365854, 104.48780488,  60.95121951],
        [134.34146341, 106.97560976,  63.43902439]],

       ...,

       [[ 36.07317073,  31.09756098,   8.70731707],
        [ 33.58536585,  28.6097561 ,   6.2195122 ],
        [ 28.6097561 ,  22.3902439 ,   3.73170732],
        ...,
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463]],

       [[ 36.07317073,  31.09756098,   8.70731707],
        [ 33.58536585,  28.6097561 ,   6.2195122 ],
        [ 28.6097561 ,  22.3902439 ,   3.73170732],
        ...,
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463]],

       [[ 34.82926829,  29.85365854,   7.46341463],
        [ 32.34146341,  27.36585366,   4.97560976],
        [ 27.36585366,  21.14634146,   2.48780488],
        ...,
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463],
        [ 82.09756098,  67.17073171,   7.46341463]]])
```
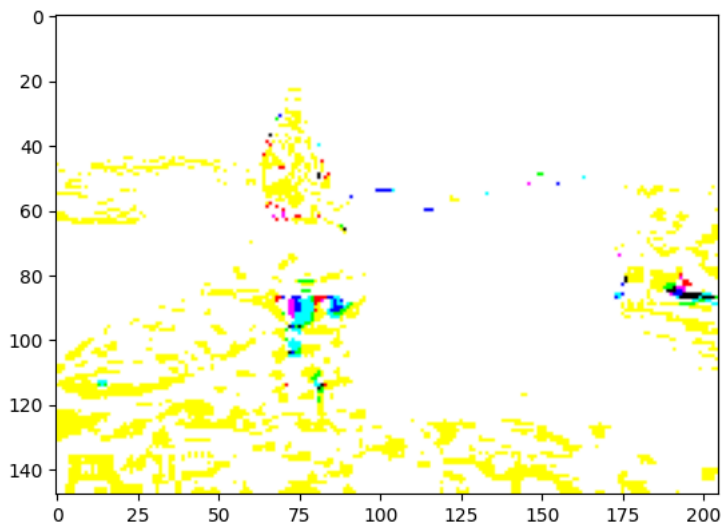
```python
plt.imshow(stretching_img)
```

```
WARNING:matplotlib.image:Clipping input data to the valid range for imshow with RGB data ([0..1] for floats or [0..255] for
<matplotlib.image.AxesImage at 0x78c6f814cdd0>
```


Bit Plane Slicing

```python
for k in range(8):
 plane = np.full(img.shape, 2**k, dtype=np.uint8)
bit_plane = cv2.bitwise_and(img, plane)

plt.imshow(bit_plane)
plt.tight_layout()
```

```
plt.show()
```