

```
from google.colab import drive
drive.mount('/gdrive')
```

Mounted at /gdrive

```
import cv2
import glob
import matplotlib.pyplot as plt
import numpy as np
from PIL import Image
import random
from tqdm.notebook import tqdm
```

```
np.random.seed(1)
```

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

```
paths = glob.glob('/content/drive/MyDrive/satellite/Images/*.jpg', recursive=True)
len(paths)
```

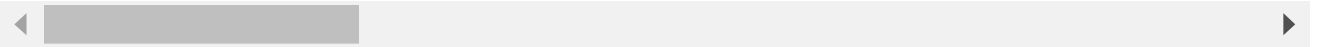
63

```
orig = np.array([np.asarray(Image.open(img)) for img in tqdm(paths)])
orig.shape
```

100%

63/63 [00:25<00:00, 2.94it/s]

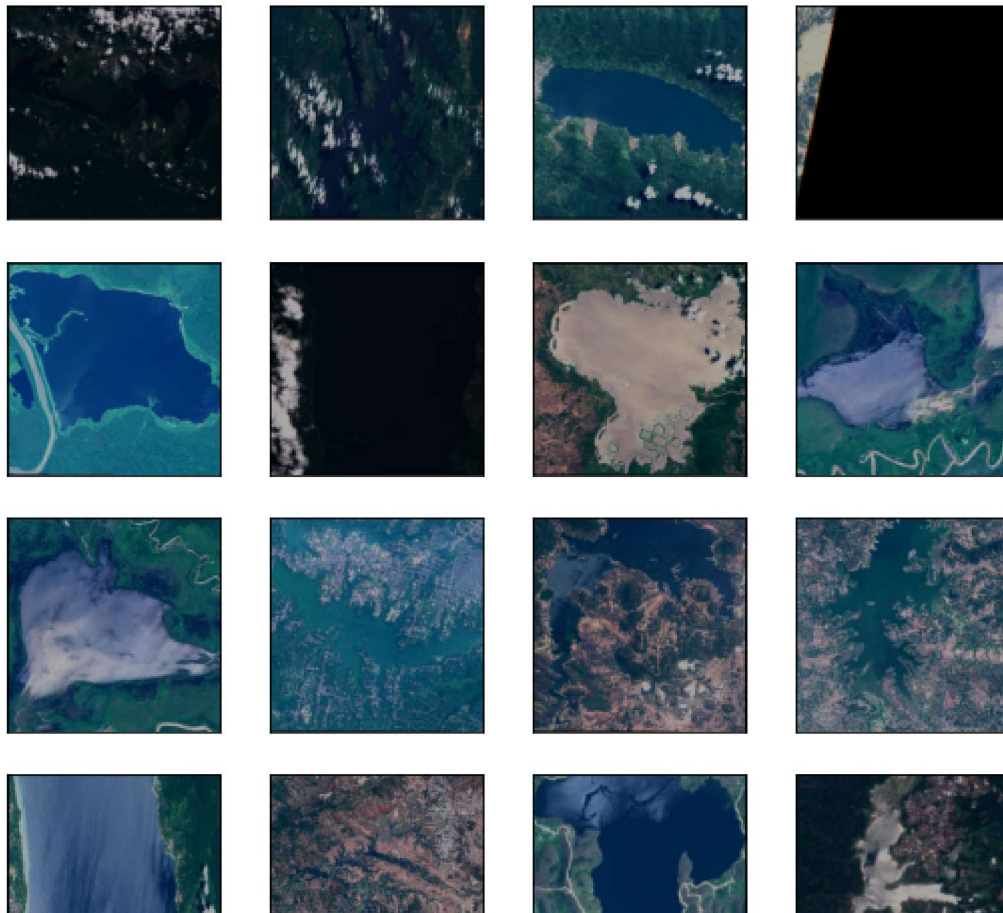
```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: VisibleDeprecationWarning:
    """Entry point for launching an IPython kernel.
(63,)
```



```
plt.figure(figsize=(9,9))
dim = (256,256)
for i, img in enumerate(orig[0:16]):
    img=cv2.resize(img, dim)
    plt.subplot(4,4,i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(img)
```

```
plt.suptitle("Original", fontsize=20)
plt.show()
```

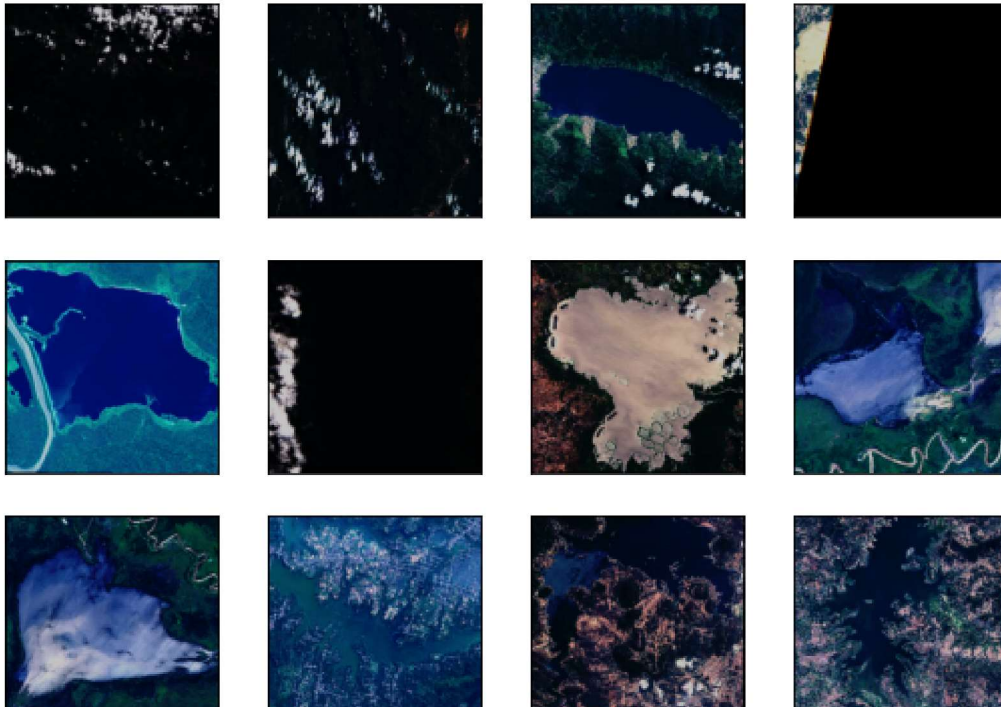
## Original



```
plt.figure(figsize=(9,9))
dim = (256,256)
for i, img in enumerate(orig[0:16]):
    img=cv2.resize(img, dim)
    xp = [0, 64, 128, 192, 255]
    fp = [0, 16, 128, 240, 255]
    x = np.arange(256)
    table = np.interp(x, xp, fp).astype('uint8')
    img = cv2.LUT(img, table)
    plt.subplot(4,4,i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(img)

plt.suptitle("Enhanced", fontsize=20)
plt.show()
```

## Enhanced

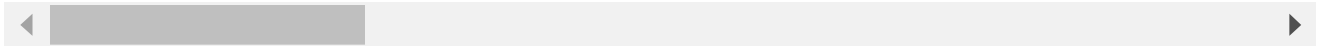


```
gray = np.array([cv2.cvtColor(img, cv2.COLOR_RGB2GRAY) for img in tqdm(orig)])
gray.shape
```

100%

63/63 [00:00&lt;00:00, 161.68it/s]

```
/usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: VisibleDeprecationWarning:
    """Entry point for launching an IPython kernel.
(63,)
```

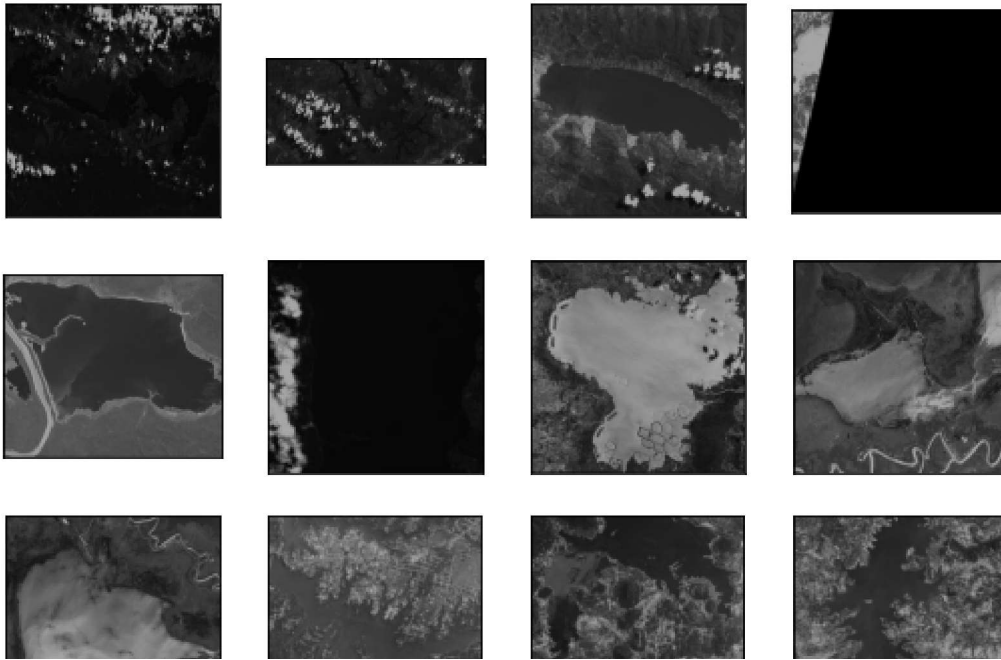


```
plt.figure(figsize=(9,9))

for i, img in enumerate(gray[0:16]):
    plt.subplot(4,4,i+1)
    plt.xticks([])
    plt.yticks([])
    plt.grid(False)
    plt.imshow(cv2.cvtColor(img, cv2.COLOR_GRAY2RGB))

plt.suptitle("Grayscale", fontsize=20)
plt.show()
```

## Grayscale



gray[0]

```
array([[ 4, 19, 18, ...,  6,  1,  1],
       [ 6, 24, 26, ..., 51, 43, 38],
       [ 5, 24, 29, ..., 53, 60, 69],
       ...,
       [28, 34, 34, ..., 17, 24,  3],
       [35, 38, 38, ..., 17, 25,  3],
       [ 4,  5,  4, ..., 17, 25,  3]], dtype=uint8)
```

```
thresh = [cv2.threshold(img, np.mean(img), 255, cv2.THRESH_BINARY_INV)[1] for img in tqdm(
```

100%

63/63 [00:00<00:00, 109.09it/s]

np.mean(gray[0])

52.881500244140625

thresh[0]

```
array([[255, 255, 255, ..., 255, 255, 255],
       [255, 255, 255, ..., 255, 255, 255],
       [255, 255, 255, ...,  0,  0,  0],
       ...,
       [255, 255, 255, ..., 255, 255, 255],
       [255, 255, 255, ..., 255, 255, 255],
       [255, 255, 255, ..., 255, 255, 255]], dtype=uint8)
```

plt.figure(figsize=(9,9))

```
for i, threshimg in enumerate(thresh[0:16]):
```

```
plt.subplot(4,4,i+1)
plt.xticks([])
plt.yticks([])
plt.grid(False)
plt.imshow(threshimg, cmap='gray')

plt.suptitle("Threshold", fontsize=20)
plt.show()
```



## Threshold

