Date:

Grayscale Spectrum

So, let me show you some code that will actually give you a very good look and feel of what are these grayscale and how these images are. Basically, the images will be in the form of numbers but they actually will be displaying different colors

```
import numpy as np
import matplotlib.pyplot as plt

# generate image
im = np.arange(4)
```

↓

img has only 4 grayscale values (0, 1, 2, 3)

0 → pure black
1, 2 → gray
3 → pure white

im.shape → array (4,)

```
im = im[np.newaxis, :]
```

→ converting to

im.shape → (1, 4)

we will repeat this to form a longer matrix like :-

```
im = np.repeat(im, 10, axis = 0)
```
↳ repeating vertically

now shape (10, 4) → 10 rows, 4 columns (grid)

im
↳ array([[0, 1, 2, 3],
[0, 1, 2, 3],
[0, 1, 2, 3],
⋮
[0, 1, 2, 3]])

```
plt.imshow(im, cmap = 'gray')
```
↳ creating this as a grayscale image

0 → Pure ~~white~~ black

1 → Dark grey

2 → light grey

3 → Pure ~~black~~ White

im is this is a matrix of no.s which has 10 rows and 8 columns

```
im = np.arange(8)
im = im[np.axis, :]
im = np.repeat(im, 10, axis = 0)
plt.imshow(im, cmap = 'gray')
```
↳ grade level & ~~grid~~ grayscale spectrum

Date :

There are images with more than 256 colors as well, grey levels as well, more than 8-bit images, sixteen, 32-bit images are also available. And yet there are high dynamic range imaging that they are the range of the colors or grayscale levels are much more than 256