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In [ ]:

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

%matplotlib inline

gamma = [0.2, 0.8, 1.2, 2]

spider_img = cv.imread(r'Images\spider.png', cv.IMREAD_GRAYSCALE)
spider_img_rgb = cv.cvtColor(spider_img, cv.COLOR_BGR2RGB)

#original
plt.imshow(spider_img_rgb)
plt.xlabel("Original Image")

#gamma correction
fig, ax = plt.subplots(2, 4, figsize=(32, 12))

for i in range(len(gamma)):
    transformation = np.array([(p/255)**(gamma[i]) * 255 for p in range(256)]).astype(

    transformed_img = cv.LUT(spider_img_rgb, transformation)

    ax[0][i].imshow(transformed_img)
    ax[0][i].set_xlabel(f"$\gamma$ = {gamma[i]}")

    ax[1][i].plot(transformation)
    ax[1][i].set_xlabel("Current Value")
    ax[1][i].set_ylabel("New Value")
    ax[1][i].set_title("Transformation")
    ax[1][i].grid()
```
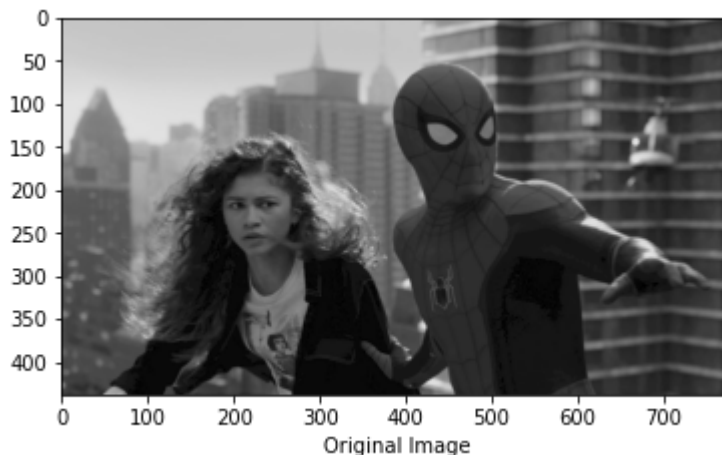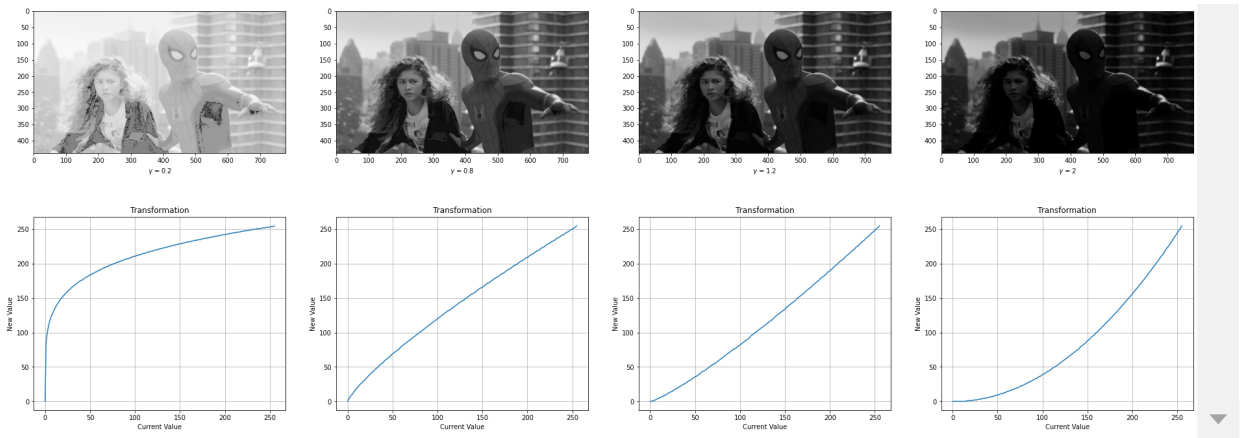

Original Image

```
In [ ]:  t1 = np.linspace(0, 100, 51)
         t2 = np.linspace(101, 255, 150)
         t3 = np.linspace(255, 255, 55)

         transform_2 = np.concatenate((t1, t2, t3), axis=0).astype(np.uint8)

         transformed_img_2 = cv.LUT(spider_img_rgb, transform_2)

         fig_2,ax_2 = plt.subplots(1, 2, figsize=(16, 4))

         ax_2[0].imshow(transformed_img_2)
         ax_2[1].plot(transform_2)
         ax_2[1].grid()
         ax_2[1].set_xlabel("Current Value")
         ax_2[1].set_ylabel("New Value")
         ax_2[1].set_title("Transformation")
```
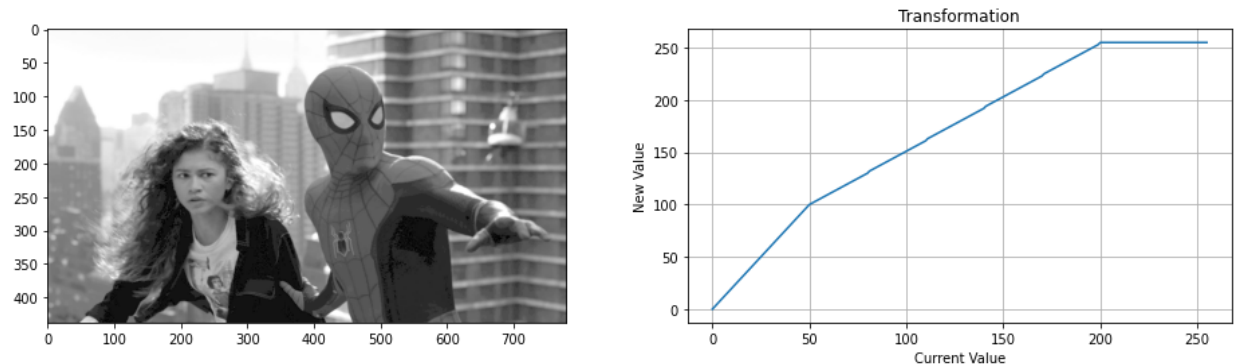
```
Out[ ]:  Text(0.5, 1.0, 'Transformation')
```
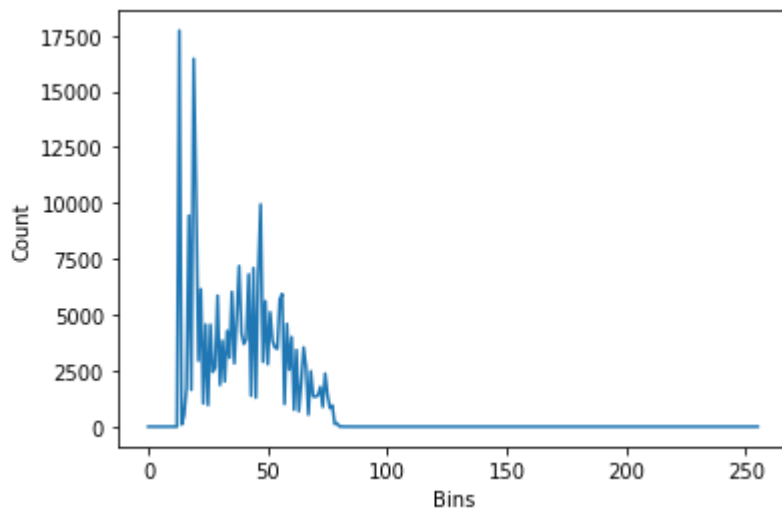


```
In [ ]:  shells_img = cv.imread(r"Images\shells.tif", cv.IMREAD_GRAYSCALE)

         shells_img_rgb = cv.cvtColor(shells_img, cv.COLOR_BGR2RGB)
         hist = cv.calcHist([shells_img_rgb], [0], None, [256], [0,256])

         plt.plot(hist)
         plt.xlabel("Bins")
         plt.ylabel("Count")
```
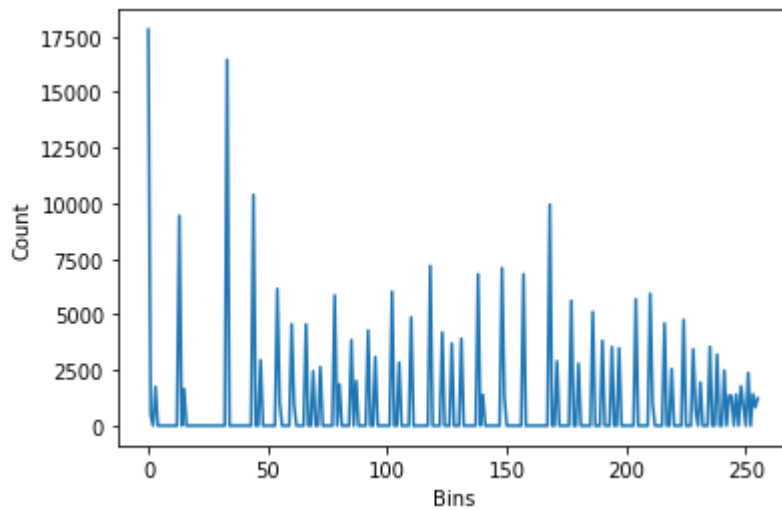
```
Out[ ]:  Text(0, 0.5, 'Count')
```

In [ ]:
```
equalised_img = cv.equalizeHist(shells_img)
equalised_hist = cv.calcHist([equalised_img], [0], None, [256], [0,256])

plt.plot(equalised_hist)
plt.xlabel("Bins")
plt.ylabel("Count")
```
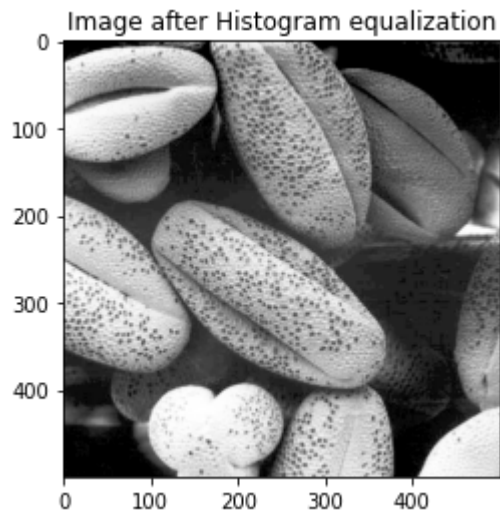
Out[ ]:
Text(0, 0.5, 'Count')

In [ ]:
```
equalised_img_rgb = cv.cvtColor(equalised_img, cv.COLOR_BGR2RGB)

plt.imshow(equalised_img_rgb)
plt.title("Image after Histogram equalization")
```

Out[ ]:
Text(0.5, 1.0, 'Image after Histogram equalization')

Image after Histogram equalization
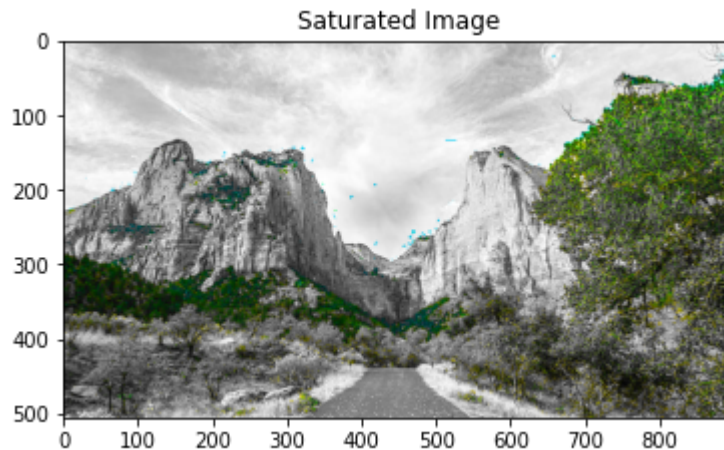
```
zion_img = cv.imread(r"Images\zion_pass.jpg")

zion_hsv = cv.cvtColor(zion_img , cv.COLOR_BGR2HSV)

zion_hsv[:,:,1] = cv.inRange(zion_hsv, (26, 10, 30), (97, 100, 255))

zion_img_sturated = cv.cvtColor(zion_hsv, cv.COLOR_HSV2RGB)

plt.imshow(zion_img_sturated)
plt.title("Saturated Image")
```
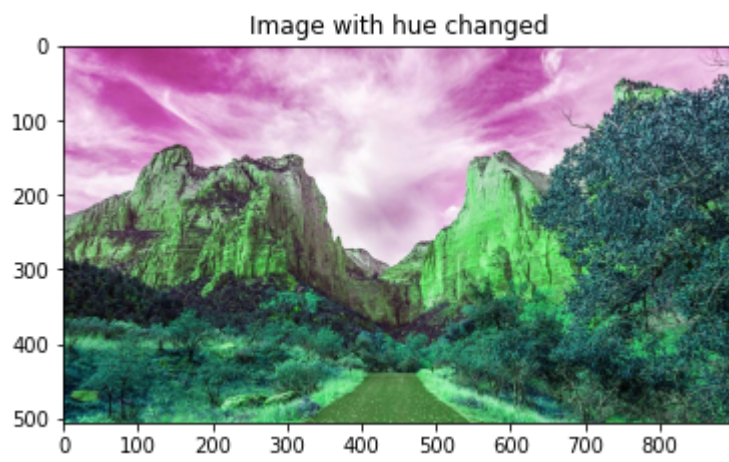
Out[ ]:   Text(0.5, 1.0, 'Saturated Image')

Saturated Image

```
zion_hsv = cv.cvtColor(zion_img , cv.COLOR_BGR2HSV)

zion_hsv[:,:,0] += 50
zion_img_hue = cv.cvtColor(zion_hsv, cv.COLOR_HSV2RGB)

plt.imshow(zion_img_hue)
plt.title("Image with hue changed")
```

Out[ ]:   Text(0.5, 1.0, 'Image with hue changed')

Image with hue changed

In [ ]: