

Ćwiczenie 7

Wypróbuj działanie wyrównywania histogramu na przykładowych obrazach. By zaobserwować skuteczność procedury, poddaj wyrównywaniu obrazy zbyt ciemne i zbyt jasne.

Narysować histogramy obrazów przed i po wyrównaniu.

```
In [1]: import matplotlib.pyplot as plt
import tifffile as tiff
from skimage import exposure
import numpy as np
```

```
In [9]: # Załadowanie pliku .tiff
img_a = tiff.imread("src/chest-xray.tif")
img_b = tiff.imread("src/pollen-dark.tif")
img_c = tiff.imread("src/pollen-ligt.tif")
img_d = tiff.imread("src/pollen-lowcontrast.tif")
img_e = tiff.imread("src/pout.tif")
img_f = tiff.imread("src/spectrum.tif")
```

```
In [13]: def histOfImg(img,title,index):
    if len(img.shape)==3:
        vals = np.mean(img,axis=2).astype(np.uint8)
    else:
        vals = img

    counts, bins = np.histogram(vals, range(257))

    plt.subplot(2,2,index)
    plt.imshow(img)
    plt.title(title)

    plt.subplot(2,2,index+1)
    plt.bar(bins[:-1] - 0.5, counts, width=1, edgecolor='none')
    plt.xlim([-0.5, 255.5])
    plt.title("Histogram ")
```

```
In [17]: def hist(img):
    plt.figure(figsize=(10, 8))
    histOfImg(img,"Obraz oryginalny",1)
    equ = exposure.equalize_hist(img)
    equ_uint8 = (equ * 255).astype(np.uint8)
    histOfImg(equ_uint8,"Obraz wyrównany",3)
    plt.tight_layout()
    plt.show()
```

```
In [18]: print("Image: chest-xray.tif")
hist(img_a)

print("Image: pollen-dark.tif")
hist(img_b)

print("Image: pollen-ligt.tif")
hist(img_c)

print("Image: pollen-lowcontrast.tif")
hist(img_d)

print("Image: chest-pout.tif")
hist(img_e)

print("Image: chest-spectrum.tif")
hist(img_f)
```

Image: chest-xray.tif

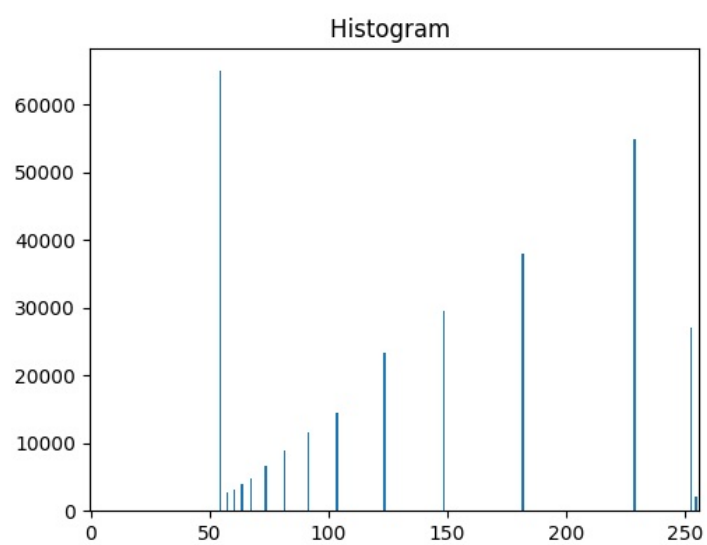
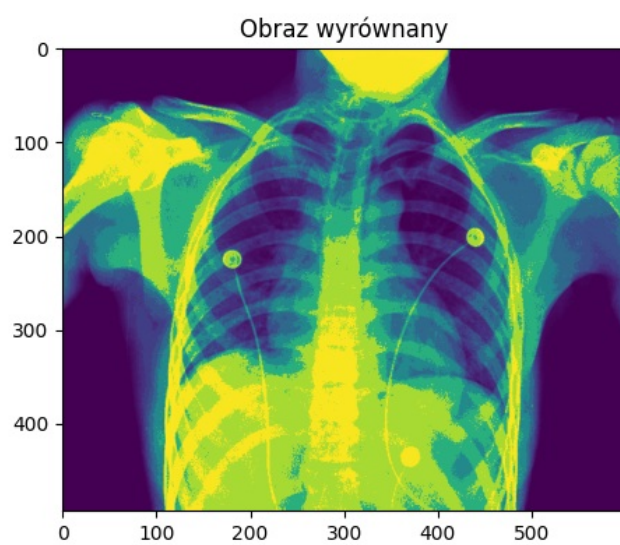
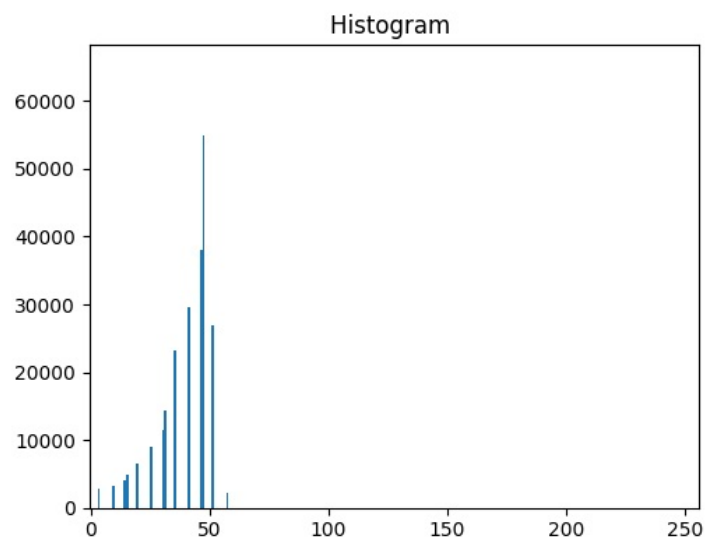
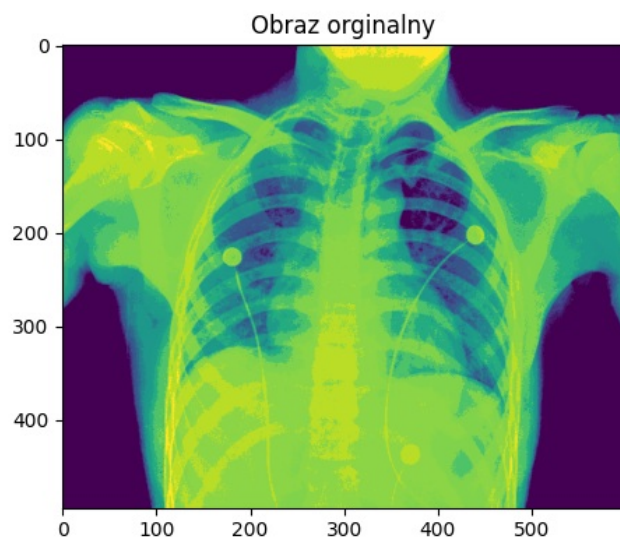


Image: pollen-dark.tif

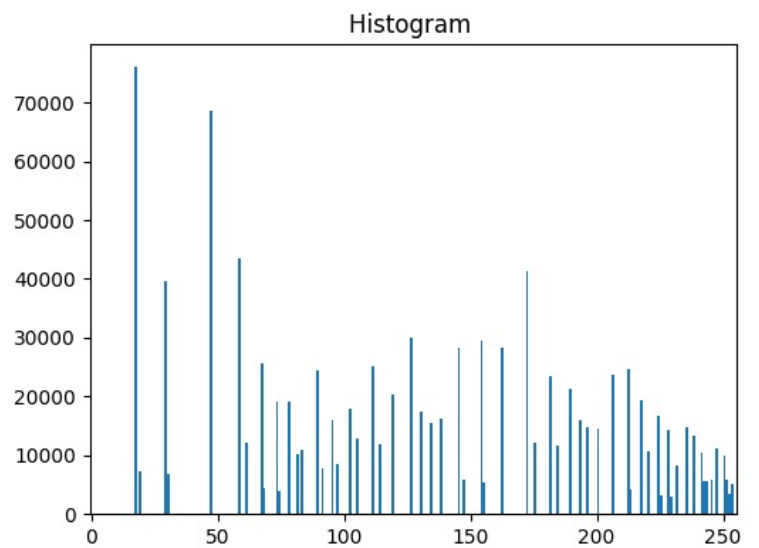
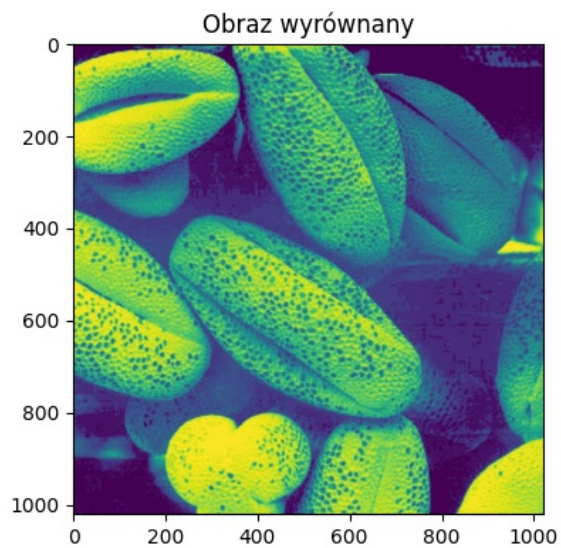
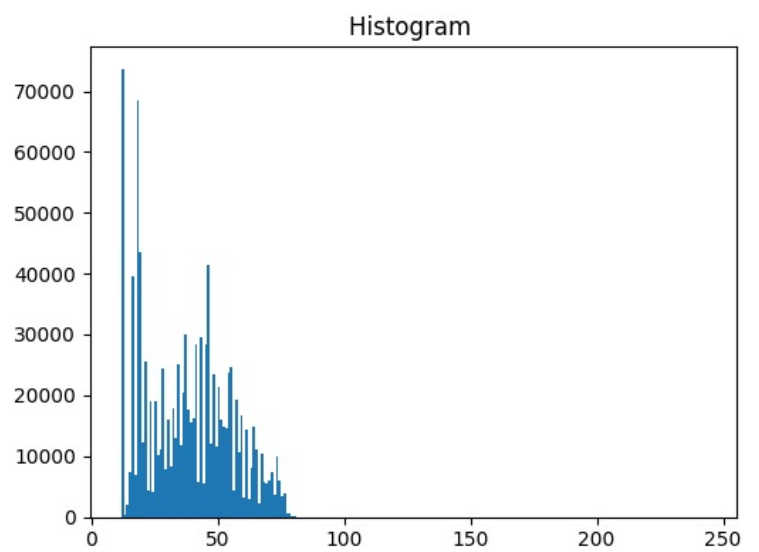
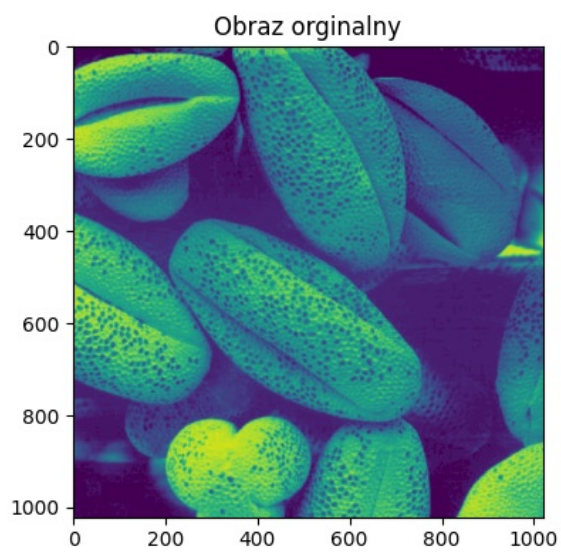


Image: pollen-ligt.tif

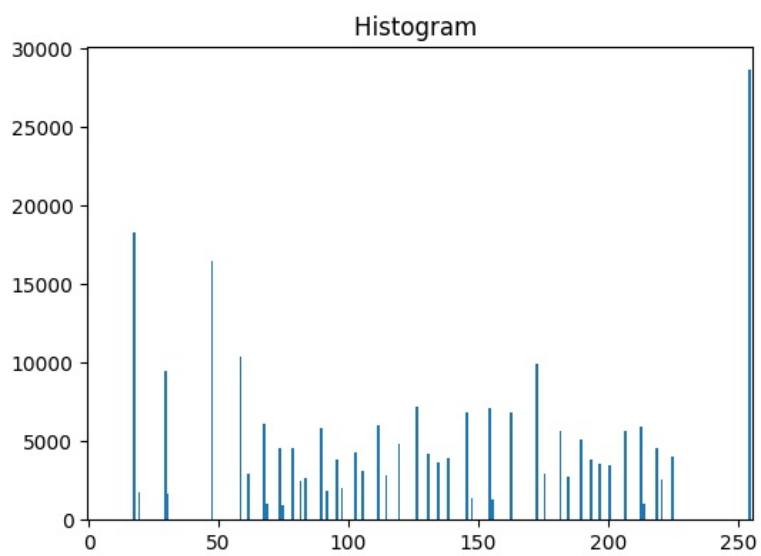
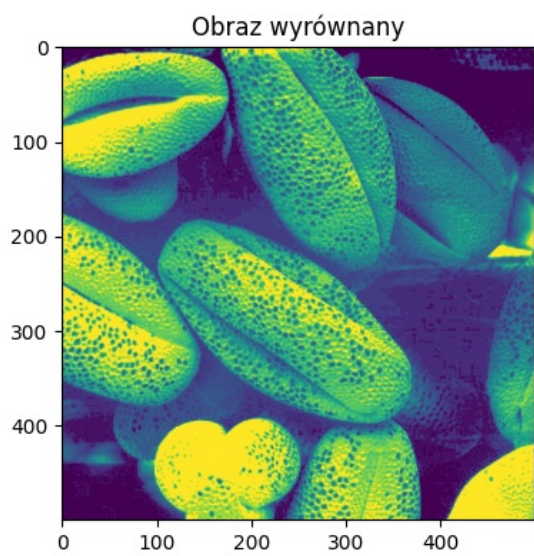
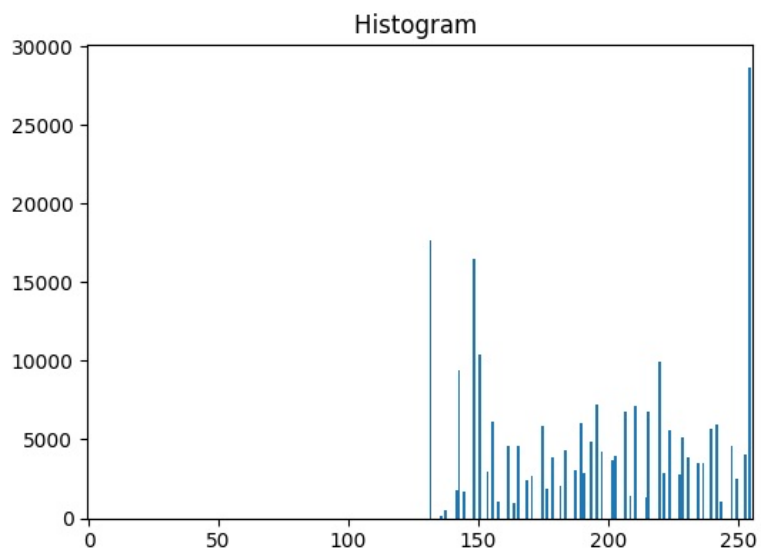
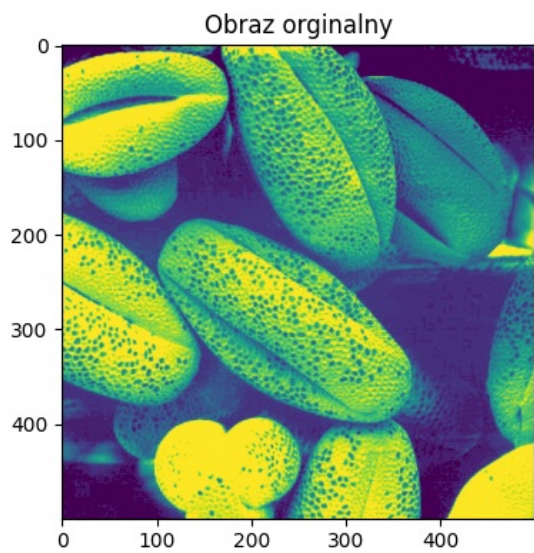


Image: pollen-lowcontrast.tif

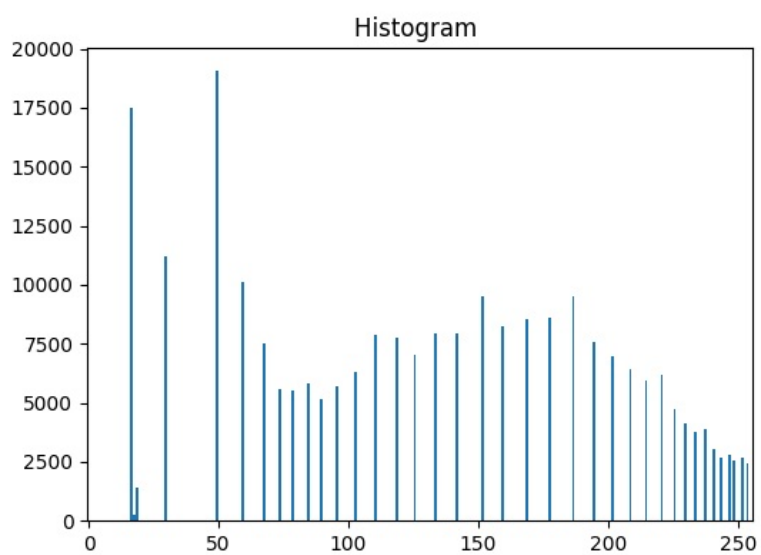
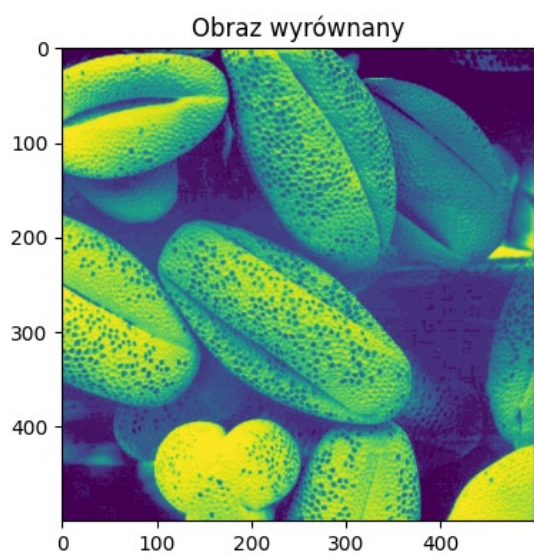
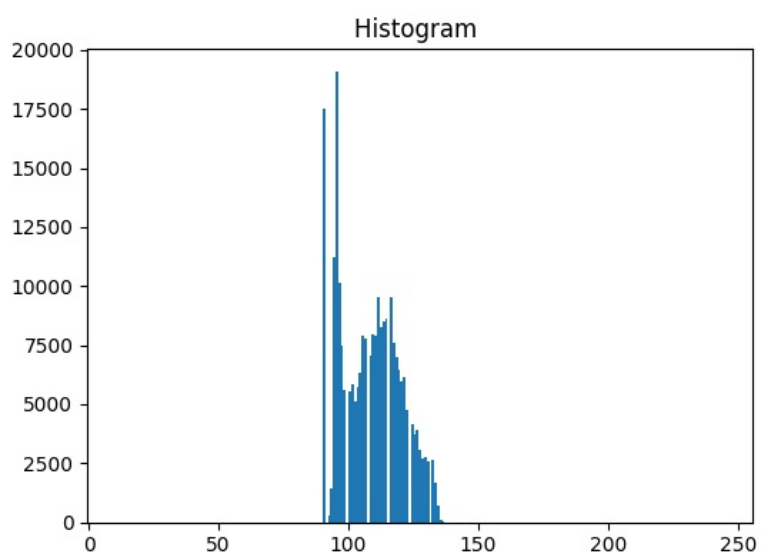
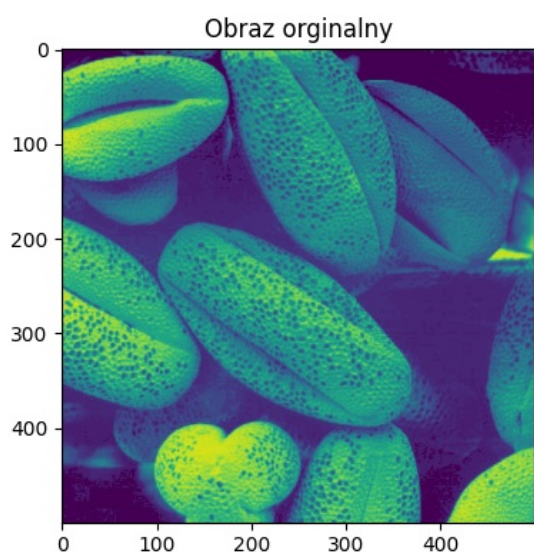


Image: chest-pout.tif

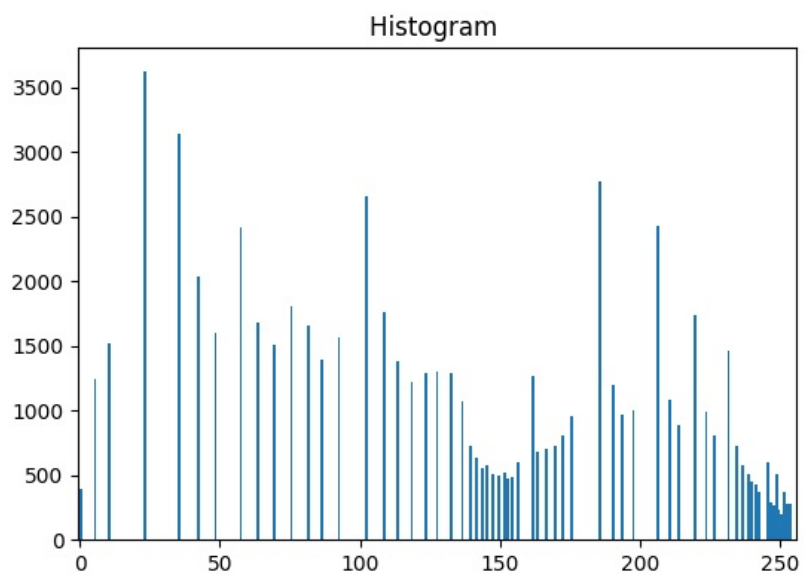
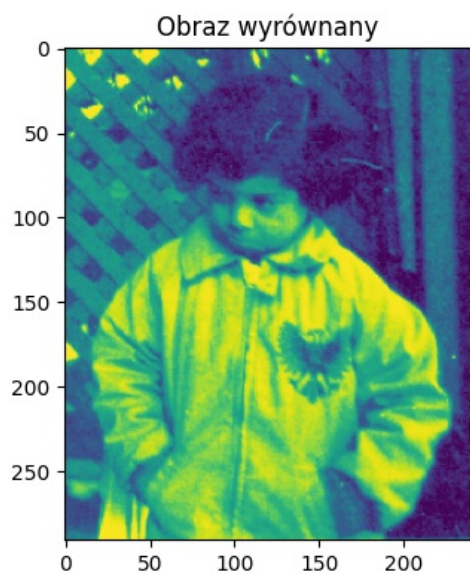
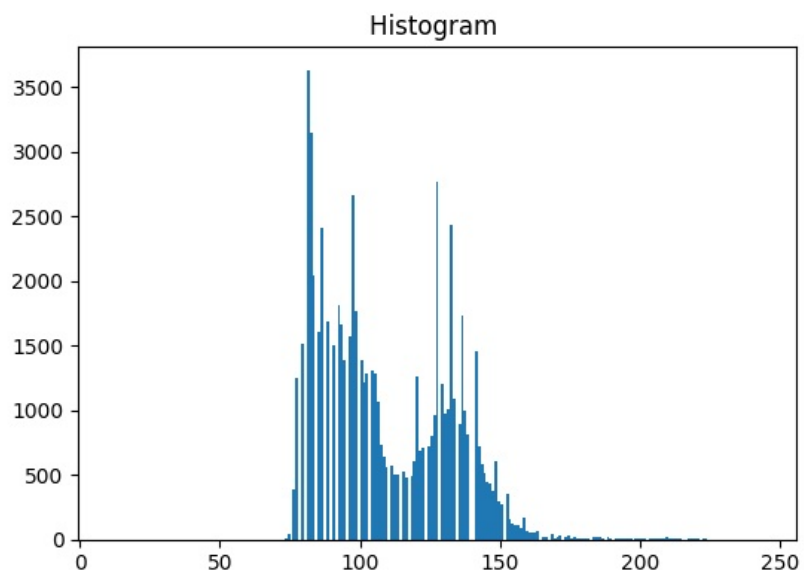
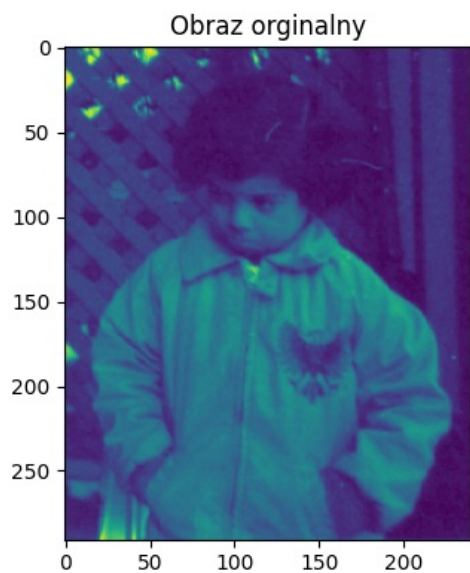
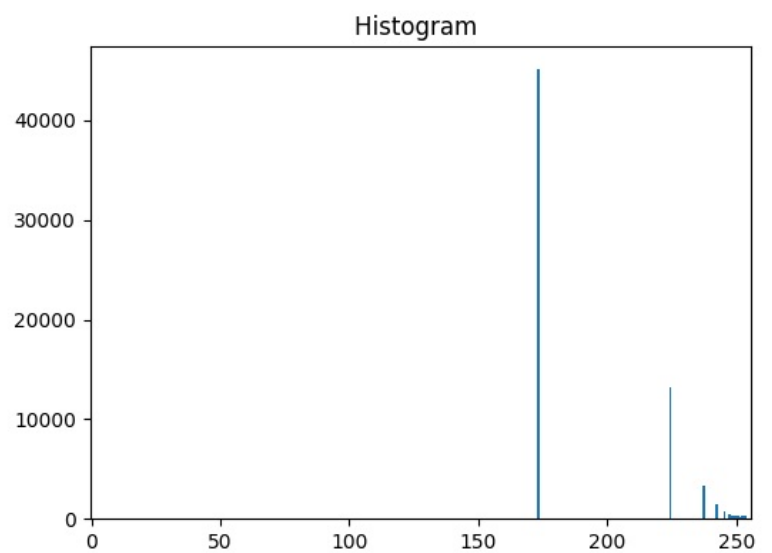
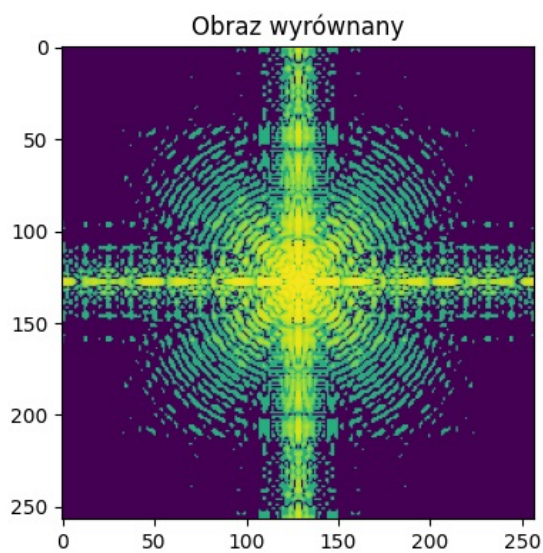
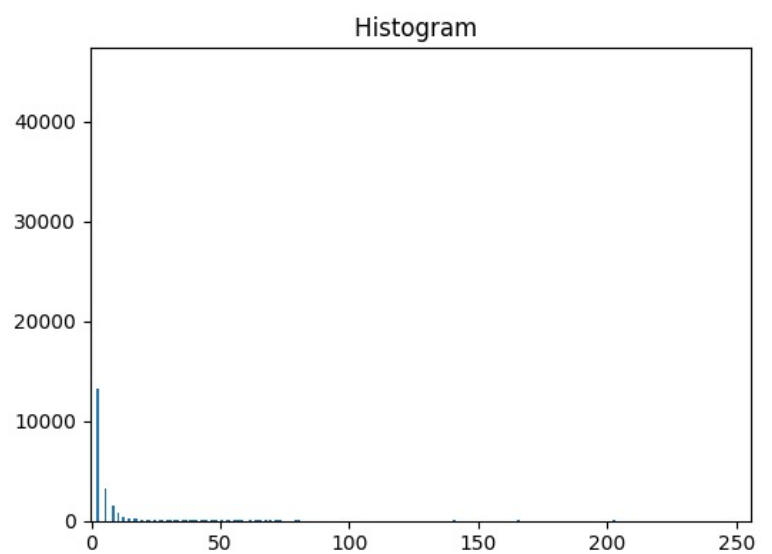
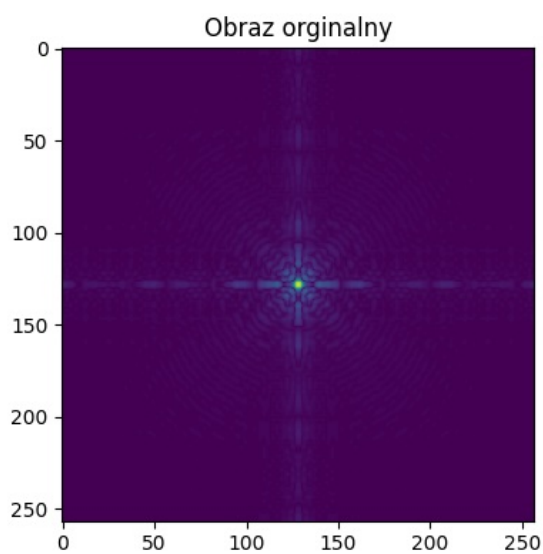


Image: chest-spectrum.tif



Na podstawie przeprowadzonych badań zauważono, że wyrównanie obrazu powiększa zakres wartości histogramu. Dzięki temu linie są bardziej widoczne, kształty mają intensywniejsze kontury oraz obrazy są jaśniejsze. Dzięki takiemu wyrównaniu można zauważyć więcej szczegółów które na obrazie są bardzo ciemne (np. spectrum.tif)