image_histogram

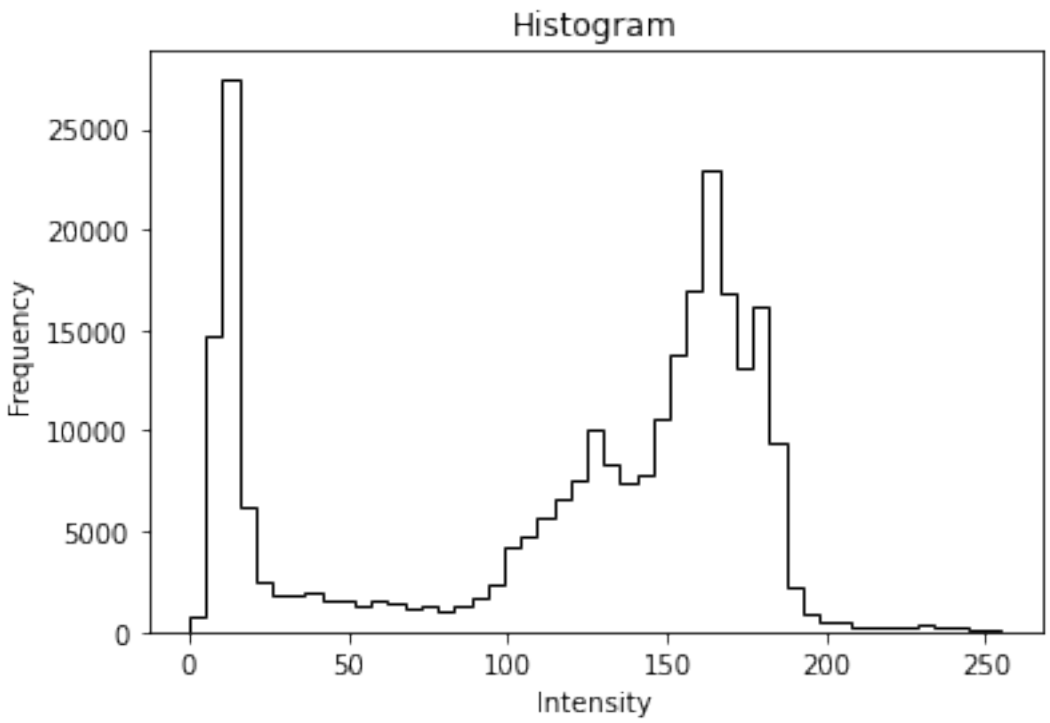
November 28, 2022

[1]:
```
import numpy as np
import matplotlib.pyplot as plt
from skimage import io, data, img_as_ubyte
from skimage.exposure import equalize_hist, match_histograms
```

1 Histogram

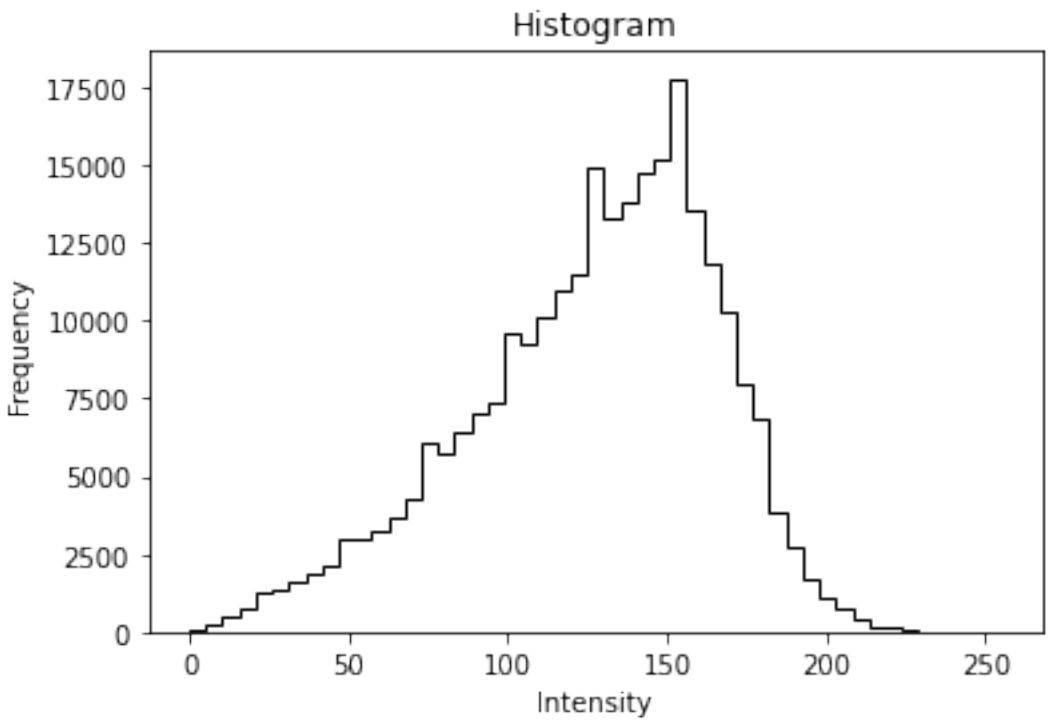
[8]:
```
im = data.camera()
v = np.concatenate(im)
bins = np.linspace(0, 255, 50)

plt.hist(v, bins, color='k', histtype='step')
plt.title("Histogram")
plt.xlabel('Intensity')
plt.ylabel('Frequency')
plt.show()
```



[9]:
```
im = data.gravel()
v = np.concatenate(im)
bins = np.linspace(0, 255, 50)

plt.hist(v, bins, color='k', histtype='step')
plt.title("Histogram")
plt.xlabel('Intensity')
plt.ylabel('Frequency')
plt.show()
```

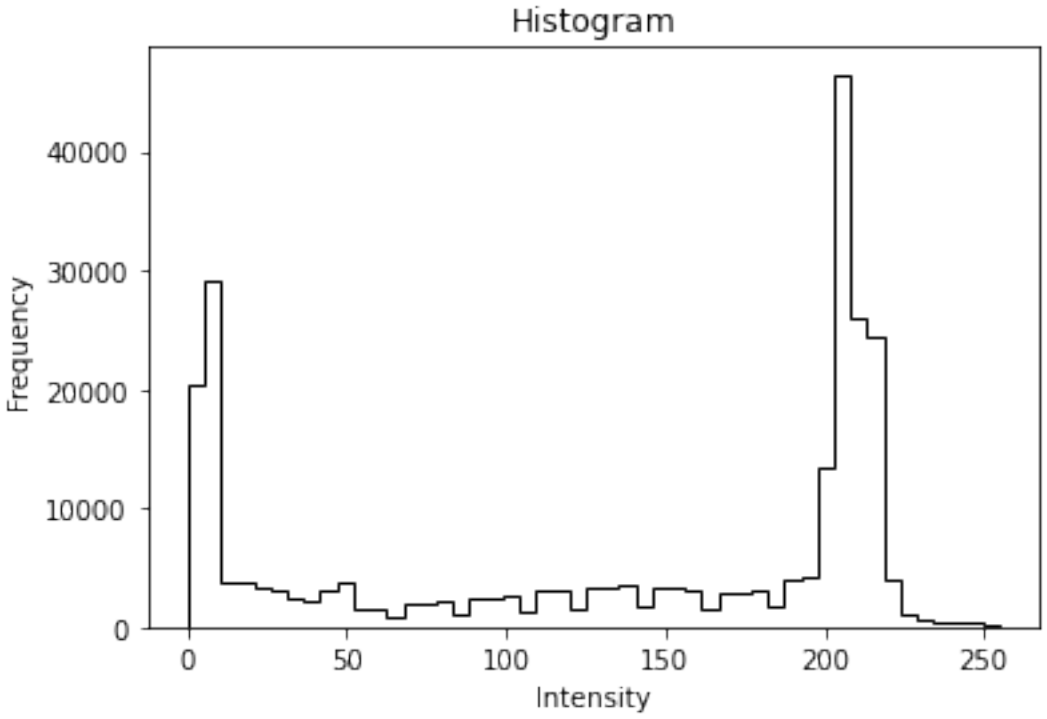


2 Contrast Stretch

[10]:
```
im = data.camera()
r1 = 100
s1 = 50
r2 = 150
s2 = 200
imf = im.copy()
for i in range(im.shape[0]):
  for j in range(im.shape[1]):
    v = im[i][j]
    #if(0 <= v and v <= r1):
    if(v >= 0 and v <= r1):
      imf[i][j] = (s1/r1 * v)
    elif(r1 < v and v <= r2):
      imf[i][j] = ((s2 - s1)/(r2 - r1)) * (v - r1) + s1
    elif(r2 < v and v <= 255):
      imf[i][j] = ((255 - s2)/(255 - r2)) * (v - r2) + s2
v = np.concatenate(imf)
bins = np.linspace(0, 255, 50)

plt.hist(v, bins, color='k', histtype='step')
plt.title("Histogram")
```

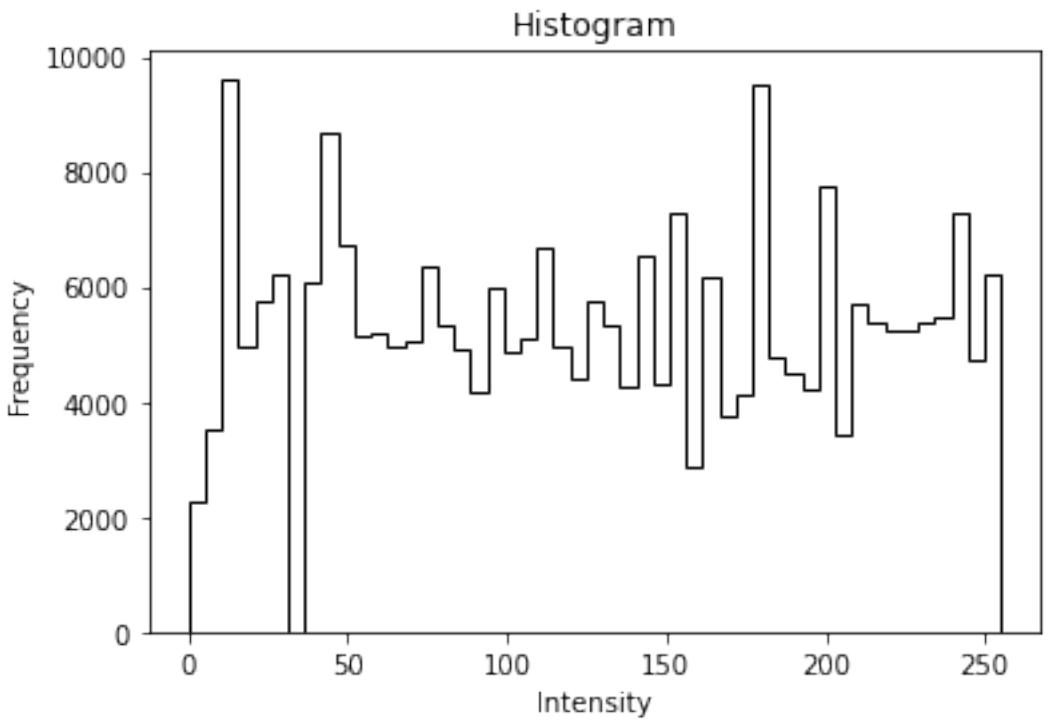
```
plt.xlabel('Intensity')
plt.ylabel('Frequency')
plt.show()
```



3 Histogram equalization

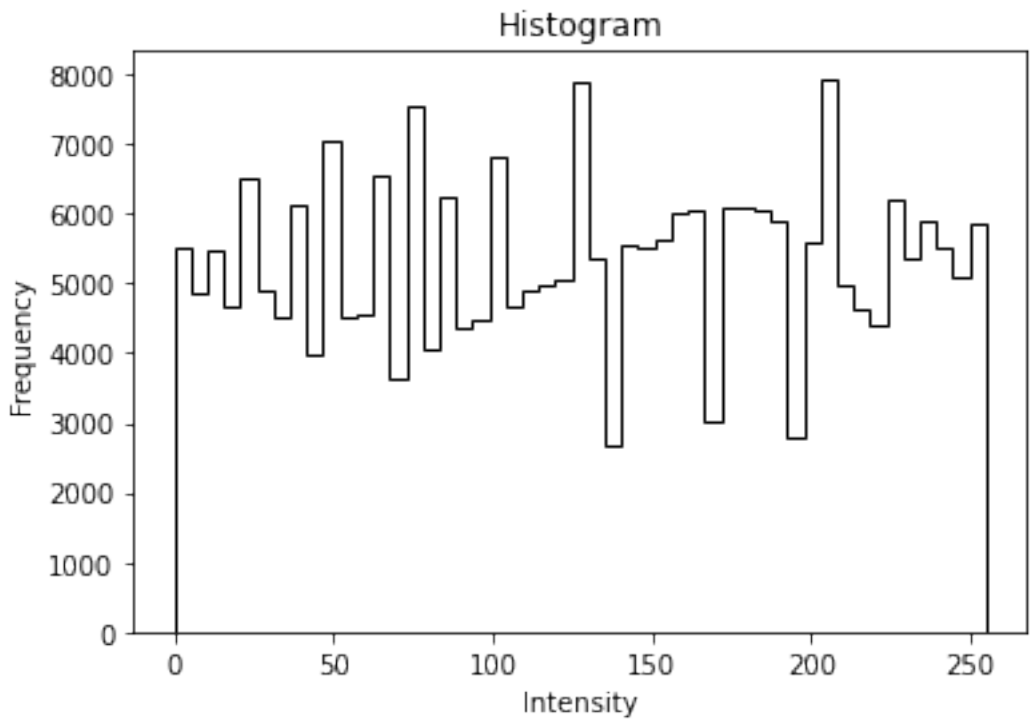
[11]:
```
im = data.camera()
imeq = equalize_hist(im)
imeq = img_as_ubyte(imeq)
v = np.concatenate(imeq)
bins = np.linspace(0, 255, 50)

plt.hist(v, bins, color='k', histtype='step')
plt.title("Histogram")
plt.xlabel('Intensity')
plt.ylabel('Frequency')
plt.show()
```



[14]:
```
im = data.gravel()
imeq = equalize_hist(im)
imeq = img_as_ubyte(imeq)
v = np.concatenate(imeq)
bins = np.linspace(0, 255, 50)

plt.hist(v, bins, color='k', histtype='step')
plt.title("Histogram")
plt.xlabel('Intensity')
plt.ylabel('Frequency')
plt.show()
```



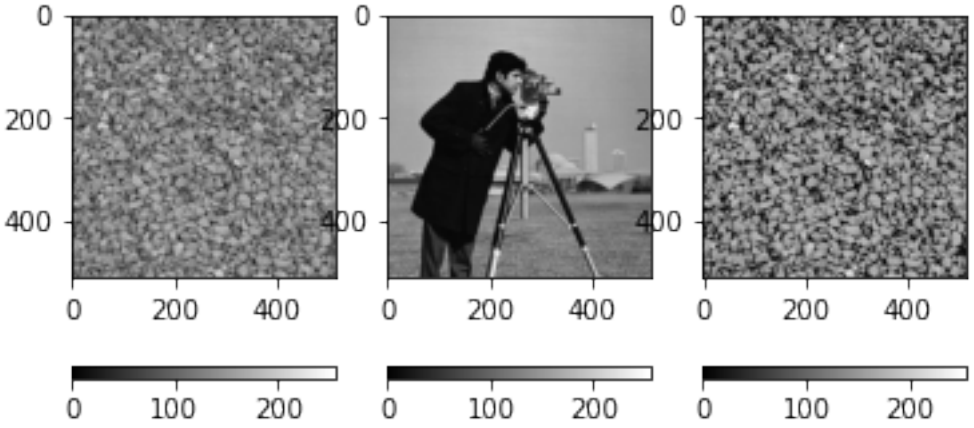
4 Histogram matching

[13]:
```
im = data.gravel()
imr = data.camera()
imm = match_histograms(im, imr)

fig = plt.figure()
ax = fig.add_subplot(1, 3, 1)
p = plt.imshow(im, cmap='gray')
c = plt.colorbar(orientation='horizontal')
plt.clim(0, 255)

ax = fig.add_subplot(1, 3, 2)
p = plt.imshow(imr, cmap='gray')
c = plt.colorbar(orientation='horizontal')
plt.clim(0, 255)

ax = fig.add_subplot(1, 3, 3)
p = plt.imshow(imm, cmap='gray')
c = plt.colorbar(orientation='horizontal')
plt.clim(0, 255)
```


0
200
400
0
200
400
0
100
200