Experiment_5a

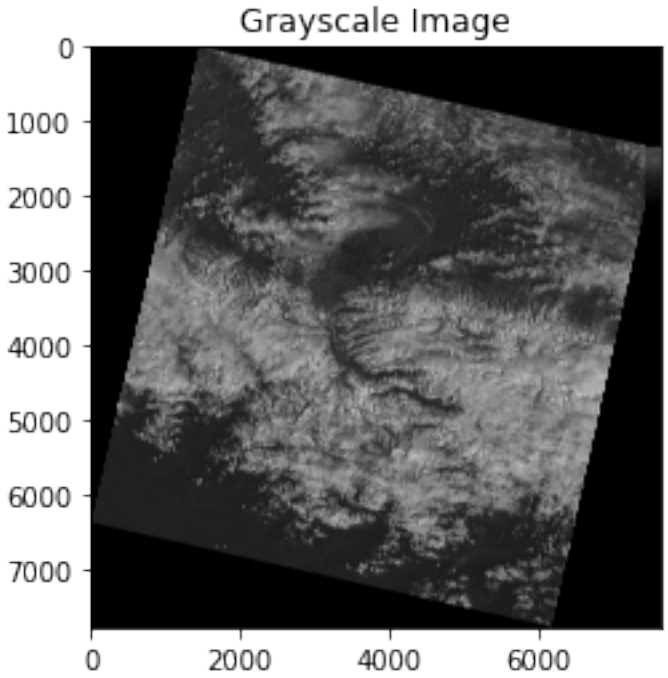
April 27, 2025

[1]:
```
import cv2
import re
import rasterio
import matplotlib.pyplot as plt
```

[2]:
```
# Read the image
image = cv2.imread('LC08_L1TP_144039_20250313_20250313_02_RT_B2.TIF')
```

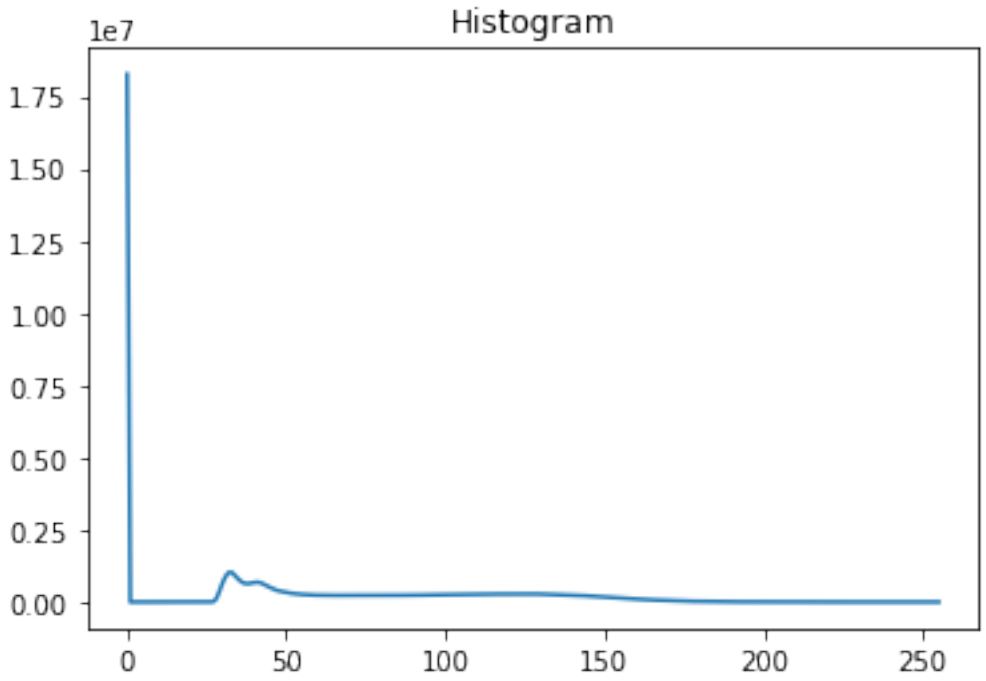
[3]:
```
# Convert to grayscale
gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)
plt.figure()
plt.title("Grayscale Image")
plt.imshow(gray, cmap='gray')
```

[3]:
```
<matplotlib.image.AxesImage at 0x1573b3c8e20>
```



[4]:
```
# Calculate and plot histogram
hist = cv2.calcHist([gray], [0], None, [256], [0, 256])
plt.figure()
plt.title("Histogram")
plt.plot(hist)
```

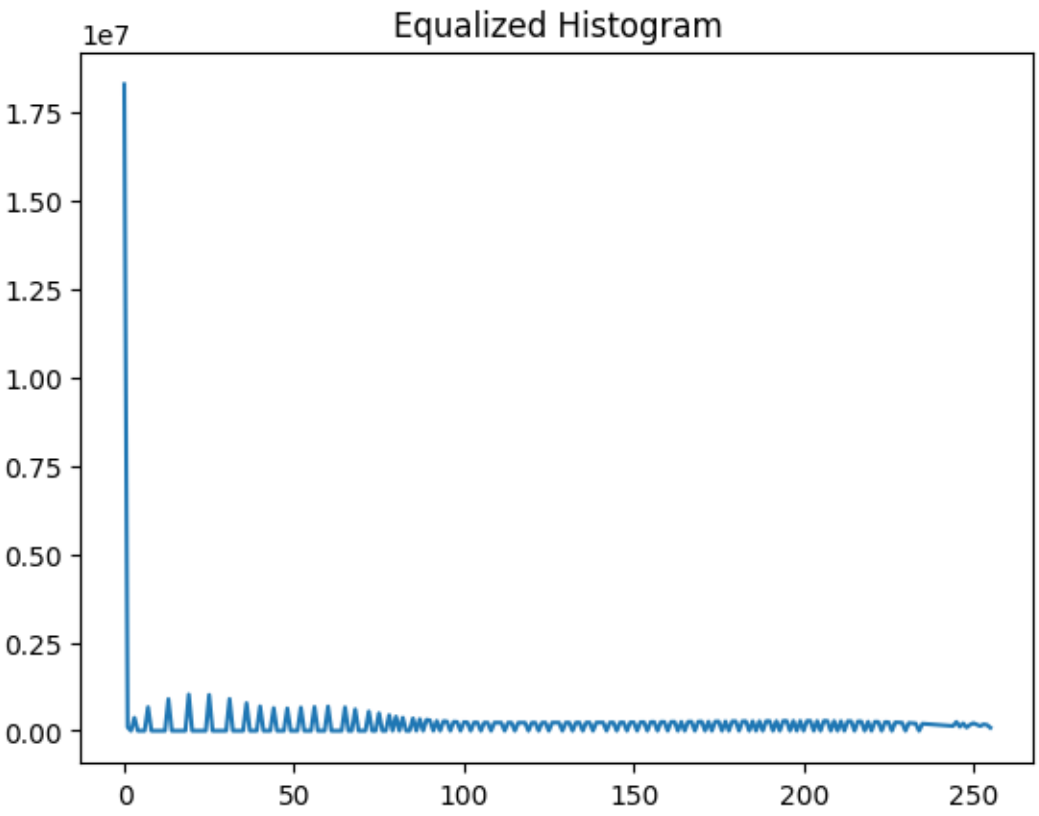
[4]: [<matplotlib.lines.Line2D at 0x157457ae850>]



[13]:
```
# Histogram equalization
equalized = cv2.equalizeHist(gray)
hist_eq = cv2.calcHist([equalized], [0], None, [256], [0, 256])

plt.figure()
plt.title("Equalized Histogram")
plt.plot(hist_eq)
```

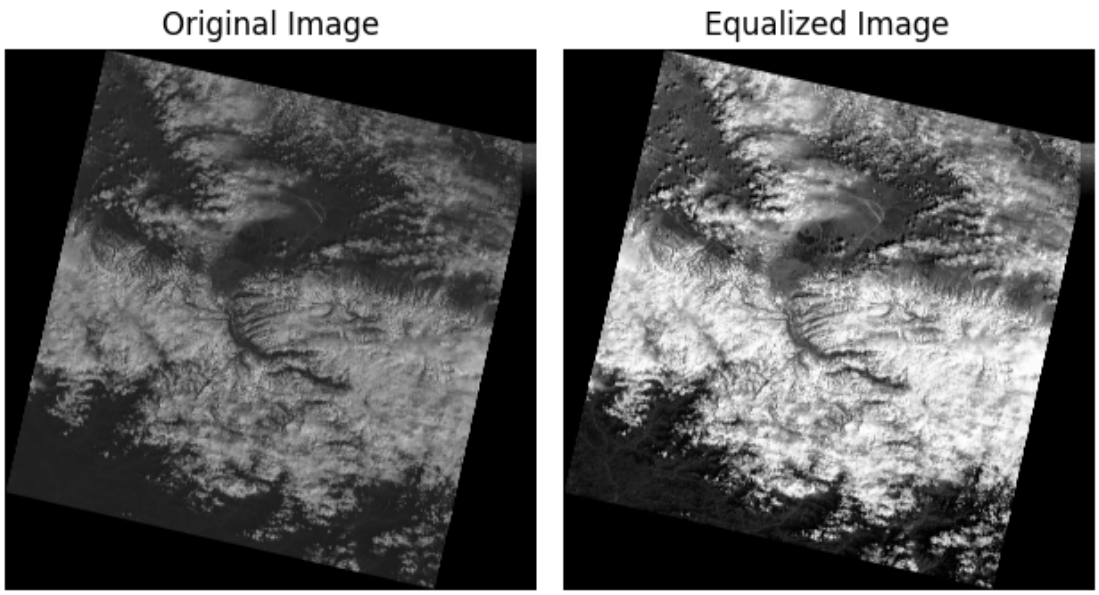
[13]: [<matplotlib.lines.Line2D at 0x22c075edff0>]



[ ]:
```
plt.subplot(1, 2, 1)
plt.title("Original Image")
plt.imshow(image, cmap='gray')
plt.axis('off')

plt.subplot(1, 2, 2)
plt.title("Equalized Image")
plt.imshow(equalized, cmap='gray')
plt.axis('off')

plt.tight_layout()
plt.show()
```

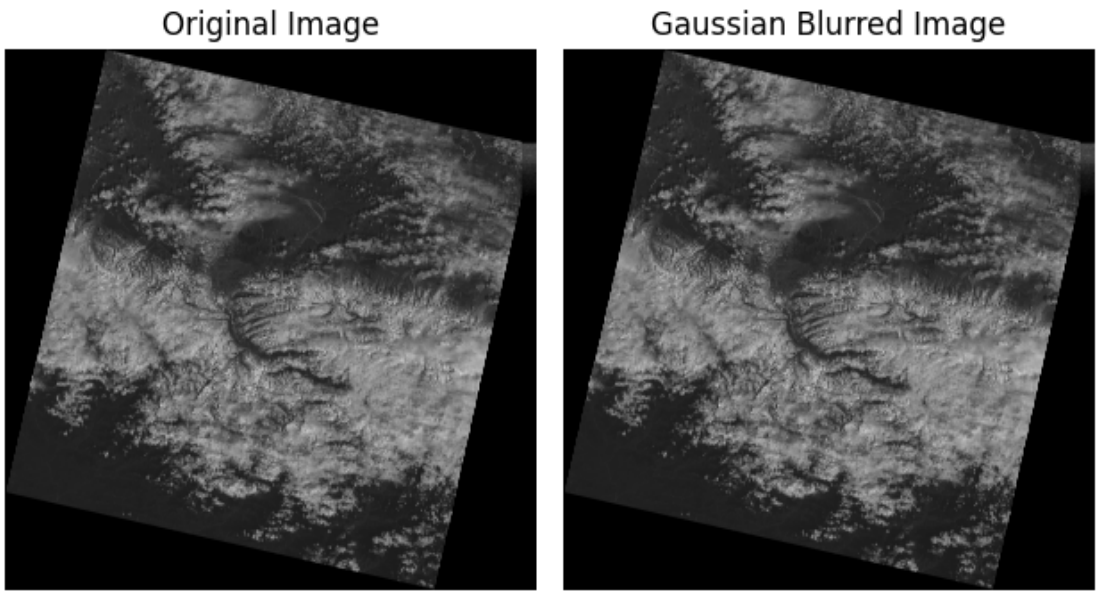


[ ]:
```
# Gaussian blur
blurred = cv2.GaussianBlur(image, (5, 5), 0)

plt.subplot(1, 2, 1)
plt.title("Original Image")
plt.imshow(image, cmap='gray')
plt.axis('off')

plt.subplot(1, 2, 2)
plt.title("Smoothen Image")
plt.imshow(blurred, cmap='gray')
plt.axis('off')

plt.tight_layout()
plt.show()
```

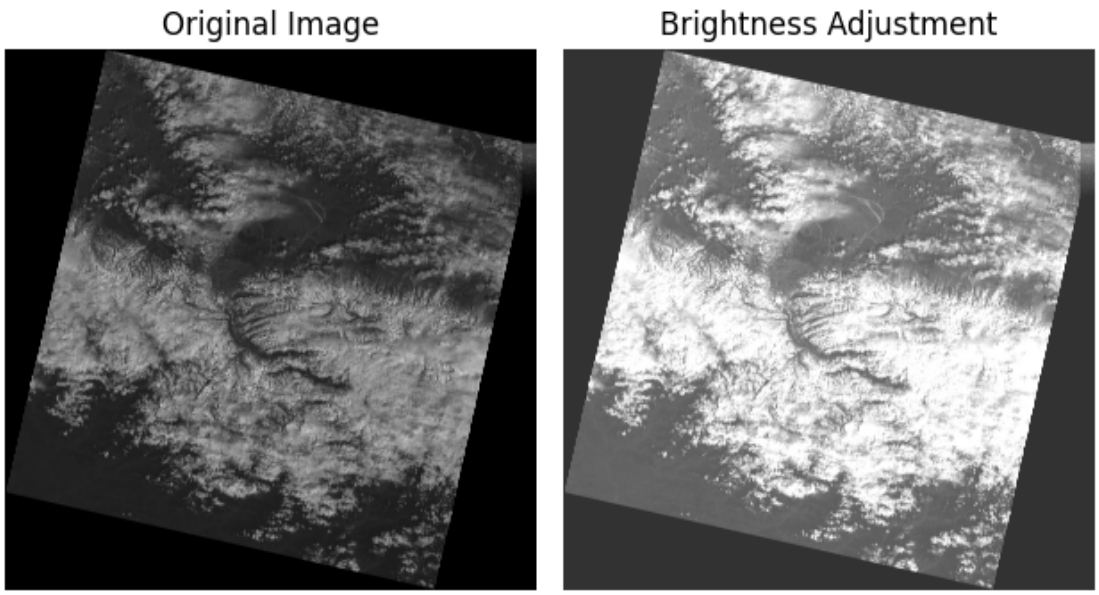


[ ]:
```
# Smooth using convertScaleAbs
bright_contrast = cv2.convertScaleAbs(image, alpha=1.5, beta=50)

plt.subplot(1, 2, 1)
plt.title("Original Image")
plt.imshow(image, cmap='gray')
plt.axis('off')

plt.subplot(1, 2, 2)
plt.title("Brightness Adjusted")
plt.imshow(bright_contrast, cmap='gray')
plt.axis('off')

plt.tight_layout()
plt.show()
```



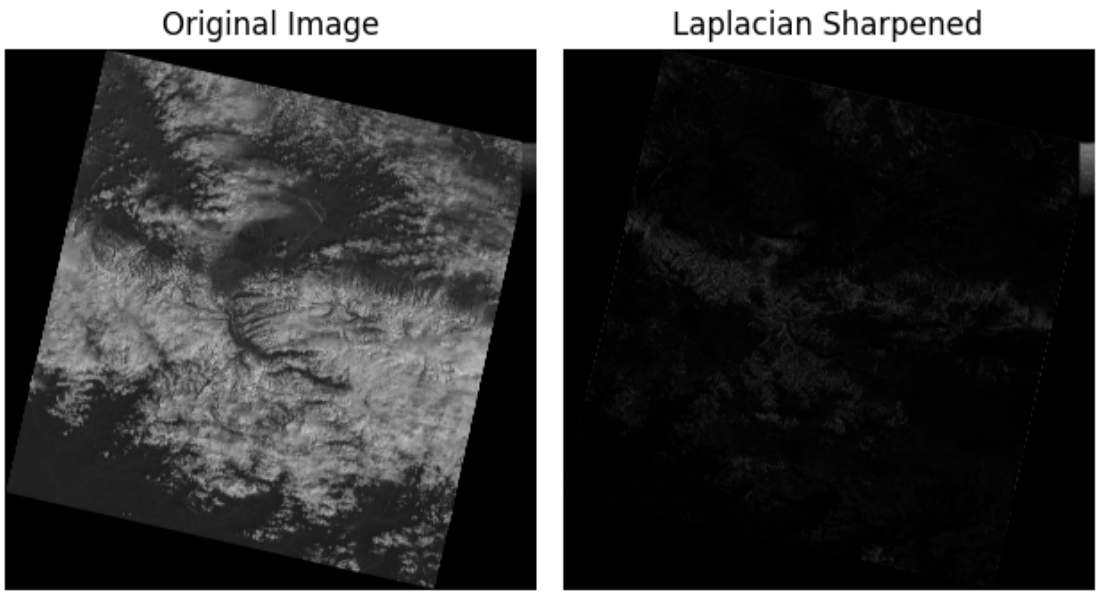
[22]:
```
# Laplacian sharpening
laplacian = cv2.Laplacian(gray, cv2.CV_64F)
laplacian_abs = cv2.convertScaleAbs(laplacian)  # Convert to 8-bit for proper
 ↪display

# Save the sharpened image (optional)
cv2.imwrite("laplacian_sharpened.png", laplacian_abs)

# Display side-by-side
plt.subplot(1, 2, 1)
plt.title("Original Image")
plt.imshow(gray, cmap='gray')  # Use gray if you're comparing to the Laplacian
 ↪of gray
plt.axis('off')

plt.subplot(1, 2, 2)
plt.title("Laplacian Sharpened")
plt.imshow(laplacian_abs, cmap='gray')
plt.axis('off')

plt.tight_layout()
plt.show()
```


Original Image
Laplacian Sharpened