EXPT NO: 3	**HISTOGRAM PROCESSING AND EQUALIZATION**
DATE: 18-07-2025	

AIM:

To Implement Histogram processing and Equalization.

ALGORITHM:

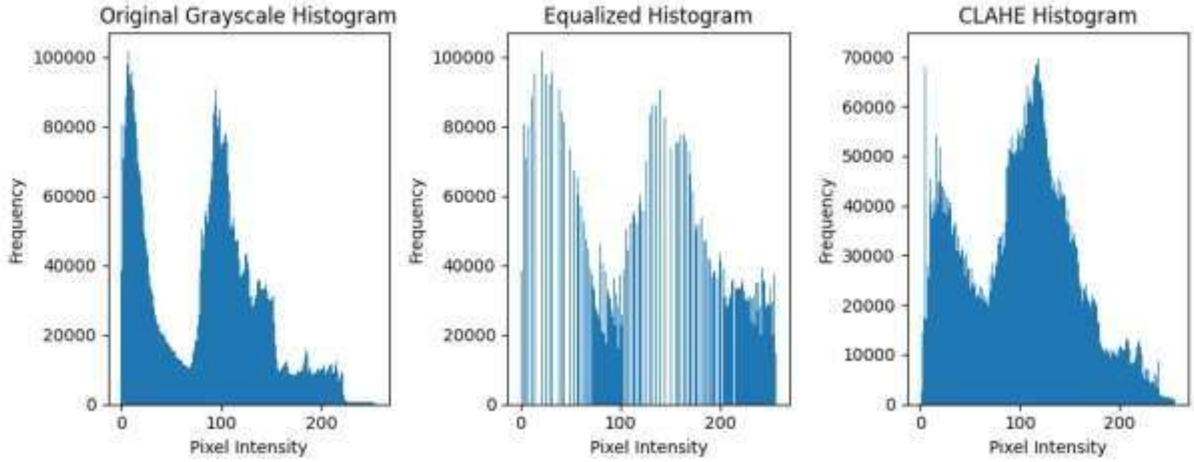
1. Convert image to grayscale.
2. Compute histogram using **cv2.calcHist().**
3. Normalize and plot the histogram.
4. Apply histogram equalization using **cv2.equalizeHist().**
5. Compare before and after histograms.
6. Display **results.**

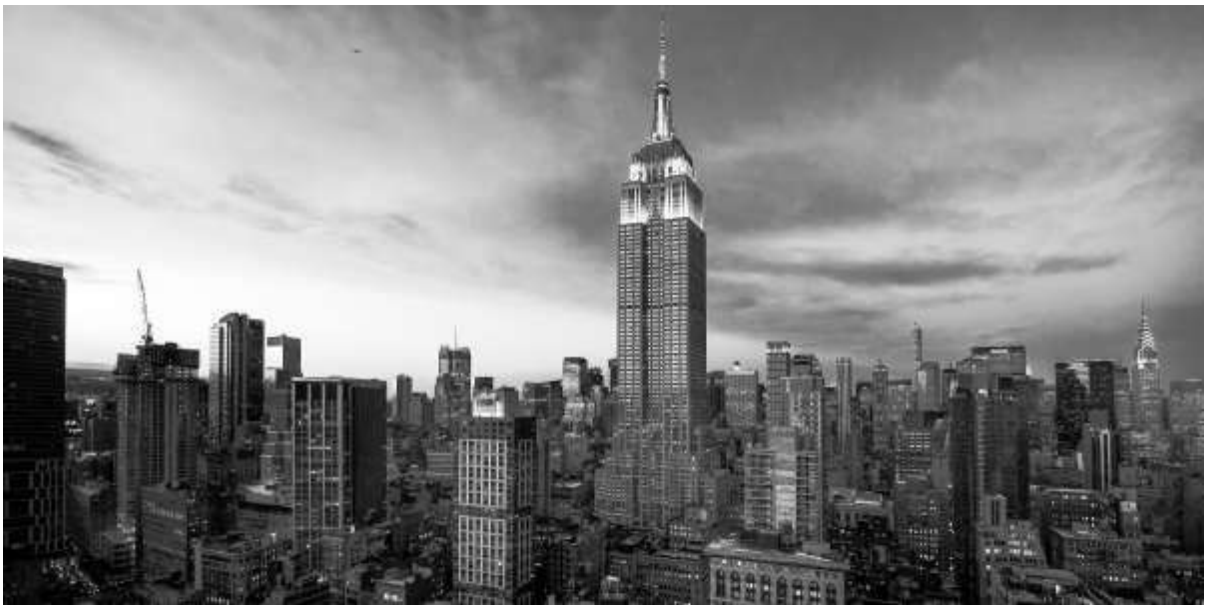
CODE:

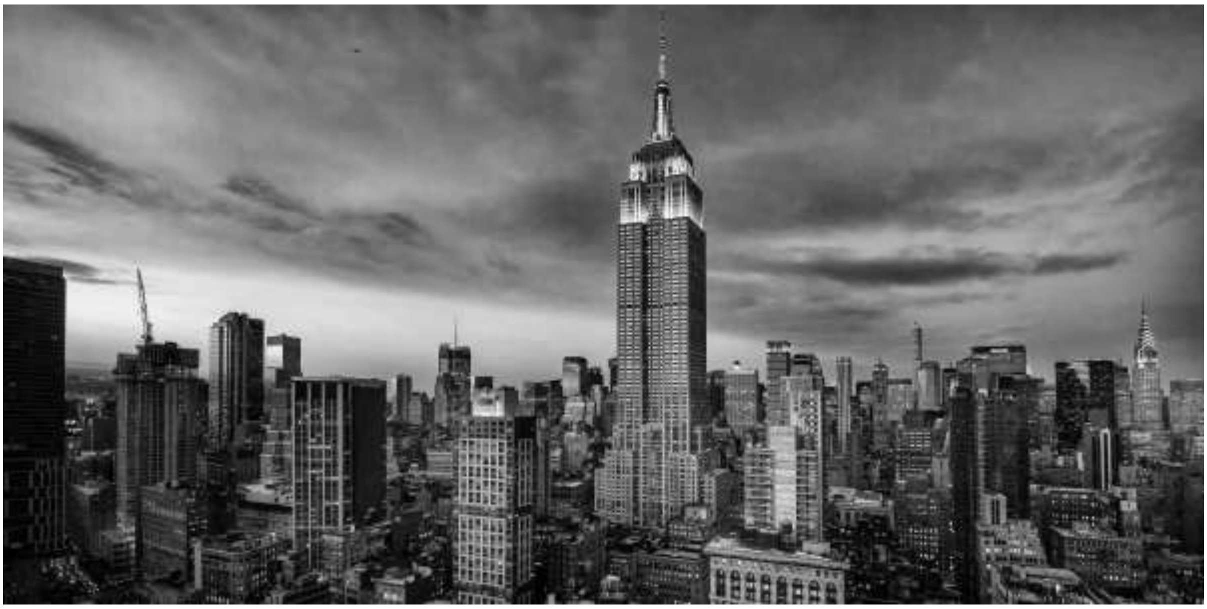
```
# PROGRAM 3
import cv2
import numpy as np
import matplotlib.pyplot as plt
from google.colab.patches import cv2_imshow # Import cv2_imshow for Colab
compatibility

# Step 2: Read the input image
image = cv2.imread('/content/EMPIRE STATE BUILDING.avif')  # Replace with your
image path

# Check if image is loaded properly
if image is None:
    print("Error: Image not found.")
    exit()

# Step 3: Convert to grayscale
```

```
gray_image = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

# Step 4: Compute histogram of original grayscale image
plt.figure(figsize=(10,4))
plt.subplot(1,3,1)
plt.title('Original Grayscale Histogram')
plt.hist(gray_image.ravel(), 256, [0,256])
plt.xlabel('Pixel Intensity')
plt.ylabel('Frequency')

# Step 5: Apply global histogram equalization
equalized_image = cv2.equalizeHist(gray_image)

# Histogram for Equalized Image
plt.subplot(1,3,2)
plt.title('Equalized Histogram')
plt.hist(equalized_image.ravel(), 256, [0,256])
plt.xlabel('Pixel Intensity')
plt.ylabel('Frequency')

# Step 6: Apply CLAHE (Contrast Limited Adaptive Histogram Equalization)
clahe = cv2.createCLAHE(clipLimit=2.0, tileGridSize=(8,8))
clahe_image = clahe.apply(gray_image)

# Histogram for CLAHE Image
plt.subplot(1,3,3)
plt.title('CLAHE Histogram')
plt.hist(clahe_image.ravel(), 256, [0,256])
plt.xlabel('Pixel Intensity')
plt.ylabel('Frequency')

plt.tight_layout()
plt.show()

# Step 7: Display original, equalized and CLAHE images
cv2_imshow(gray_image) # Use cv2_imshow
cv2_imshow(equalized_image) # Use cv2_imshow
cv2_imshow(clahe_image) # Use cv2_imshow


# Step 8: Wait for key press and close windows
# cv2.waitKey(0) # waitKey and destroyAllWindows are not needed with cv2_imshow
# cv2.destroyAllWindows() # waitKey and destroyAllWindows are not needed with cv2_imshow
```

OUTPUT:


Original Grayscale Histogram
Equalized Histogram
CLAHE Histogram
Frequency
Pixel Intensity
0
100
200
20000
40000
60000
80000
100000
10000
30000
50000
70000





RESULT:

Thus, Histogram processing and Equalization implemented successfully.