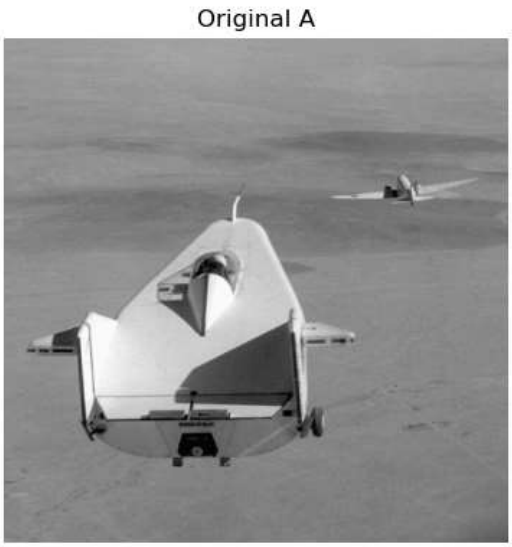
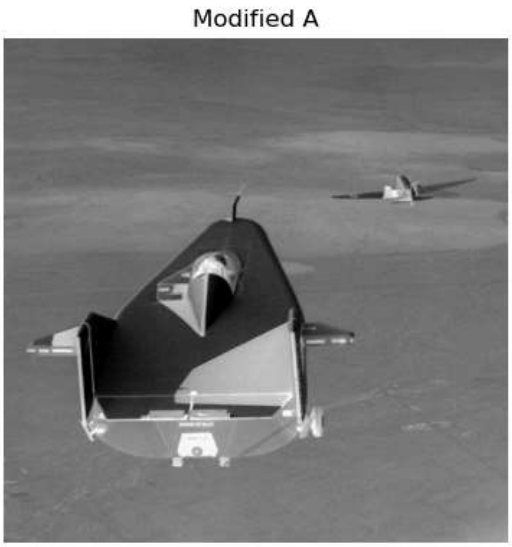
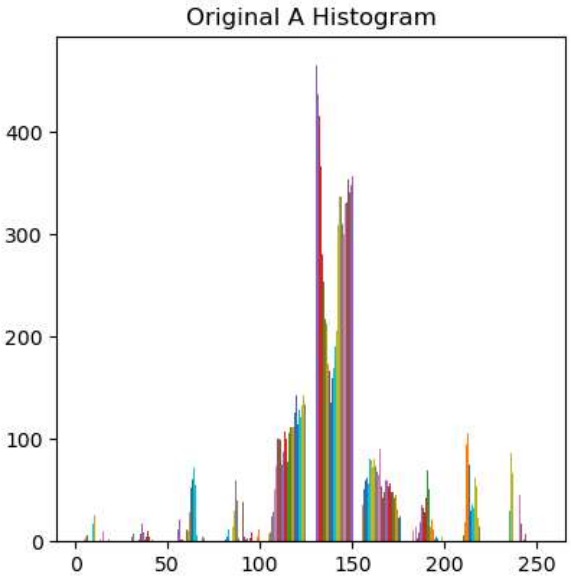
In [9]:
```
import cv2
import numpy as np
import matplotlib.pyplot as plt
```

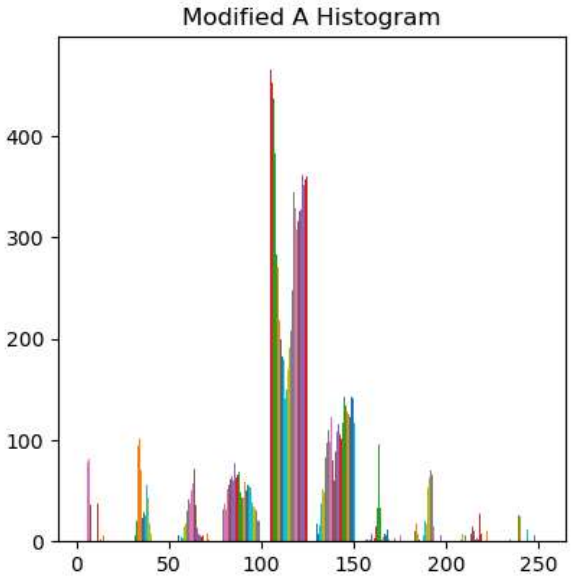
A_original.png

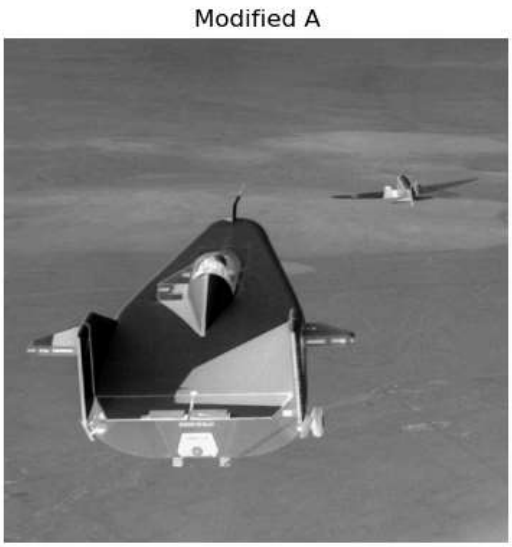
In [49]:
```
imageA = cv2.imread('images/A_original.png',cv2.IMREAD_GRAYSCALE)
modifiedA =cv2.imread('images/A_modified.png',cv2.IMREAD_GRAYSCALE)

reproducedA = 255 - imageA

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageA, cmap='gray')
plt.title('Original A')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(imageA)
plt.title('Original A Histogram')


plt.subplot(2, 2, 2)
plt.imshow(modifiedA, cmap='gray')
plt.title('Modified A')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(modifiedA)
plt.title('Modified A Histogram')
plt.show()
#-----------------------------------------------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedA, cmap='gray')
plt.title('Modified A')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedA)
plt.title('Modified A Histogram')

plt.subplot(2, 2, 2)
plt.imshow(reproducedA, cmap='gray')
plt.title('Reproduced A')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedA)
plt.title('Reproduced A Histogram')
plt.show()
```

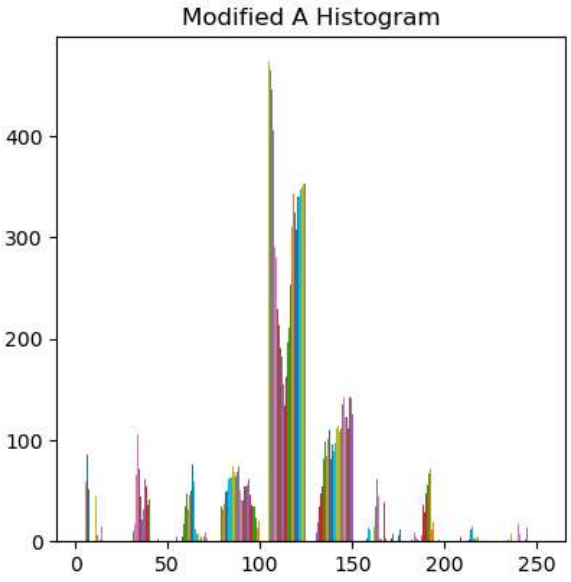

Original A

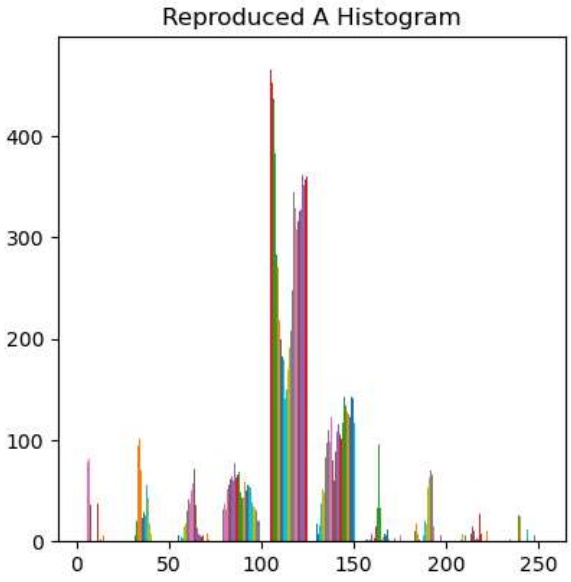

Modified A


Original A Histogram
400
300
200
100
0
0
50
100
150
200
250


Modified A Histogram
400
300
200
100
0
0
50
100
150
200
250



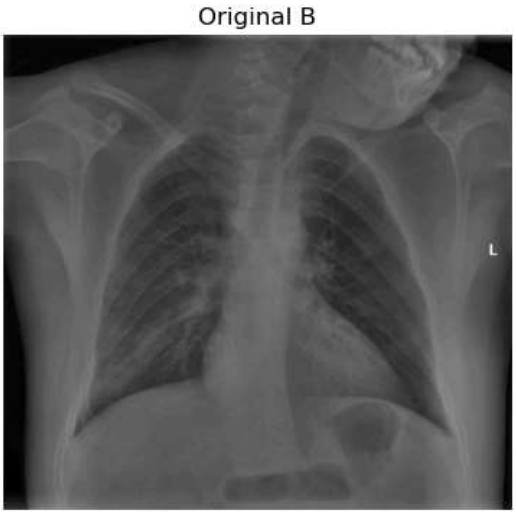


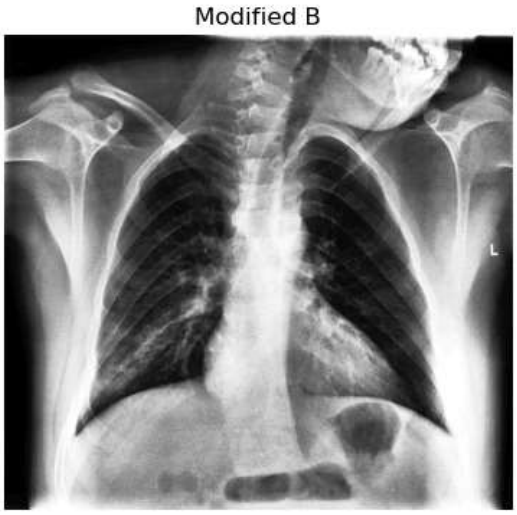


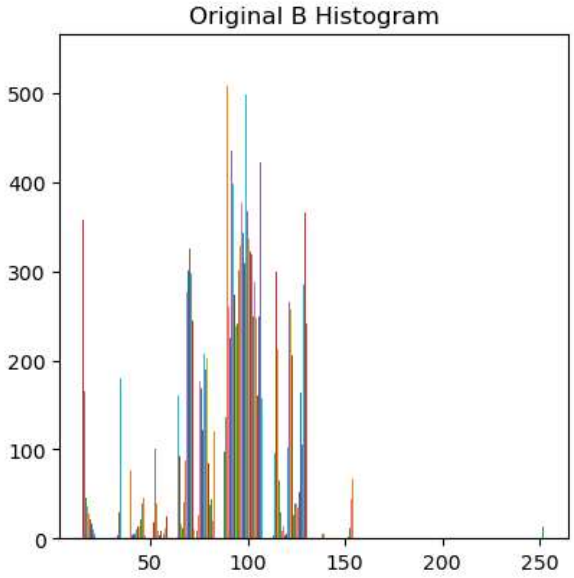
B_original.png

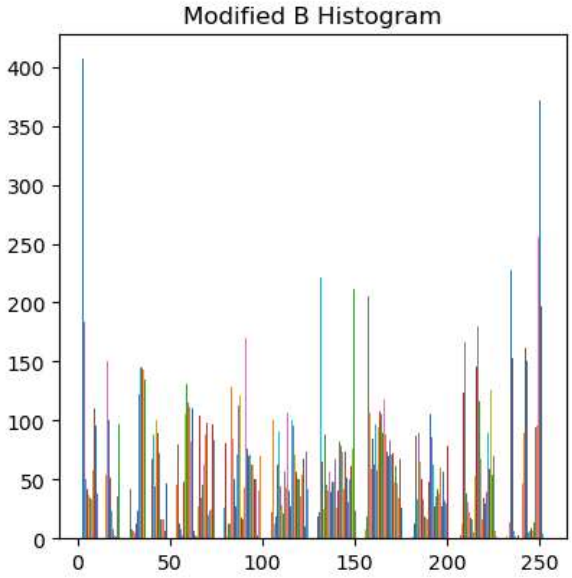
In [59]:
```
imageB = cv2.imread('images/B_original.png', cv2.IMREAD_GRAYSCALE)
modifiedB = cv2.imread('images/B_modified.png', cv2.IMREAD_GRAYSCALE)
# Histogram Equalization
reproducedB = cv2.equalizeHist(imageB)

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageB, cmap='gray')
plt.title('Original B')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(imageB)
plt.title('Original B Histogram')


plt.subplot(2, 2, 2)
plt.imshow(modifiedB, cmap='gray')
plt.title('Modified B')
plt.axis('off')

plt.subplot(2, 2, 4)
```

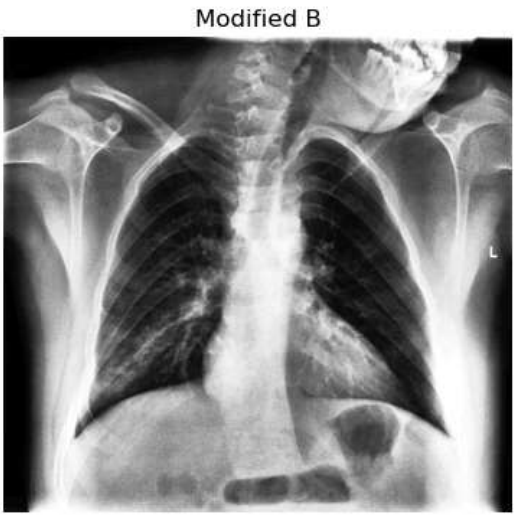
```
plt.hist(modifiedB)
plt.title('Modified B Histogram')
plt.show()
#------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedB, cmap='gray')
plt.title('Modified B')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedB)
plt.title('Modified B Histogram')


plt.subplot(2, 2, 2)
plt.imshow(reproducedB, cmap='gray')
plt.title('Reproduced B')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedB)
plt.title('Reproduced B Histogram')
plt.show()
```

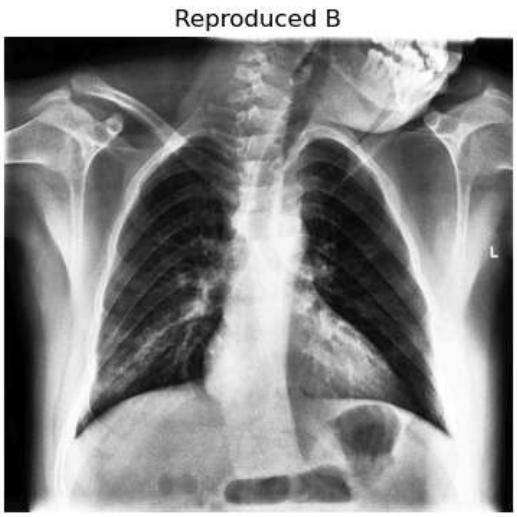


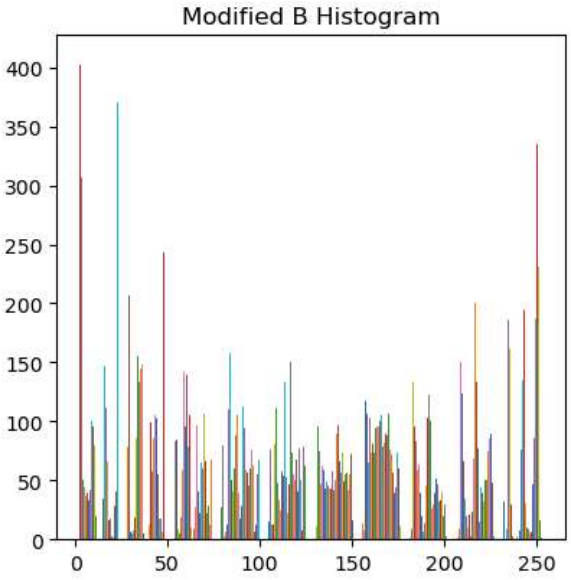


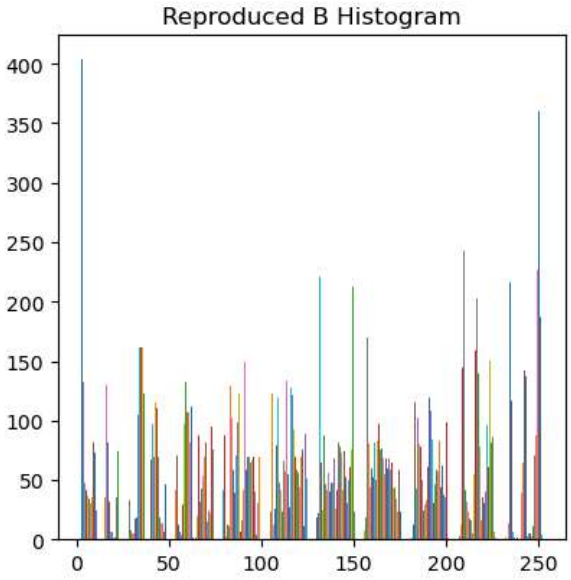








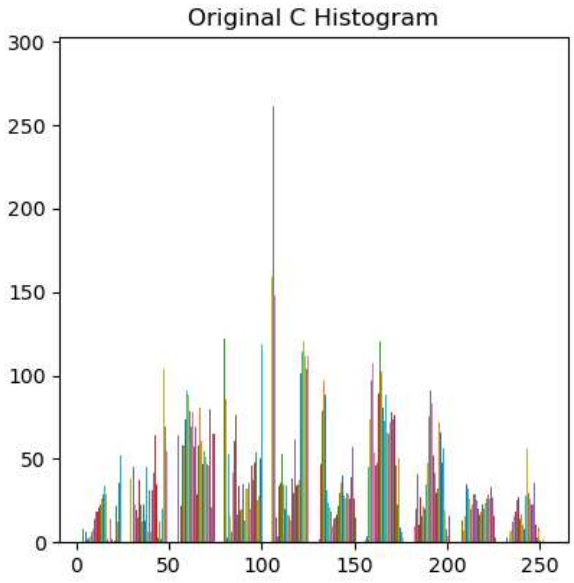


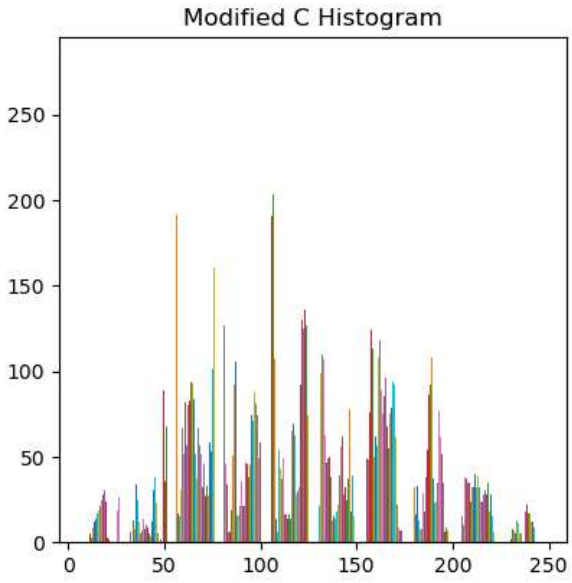


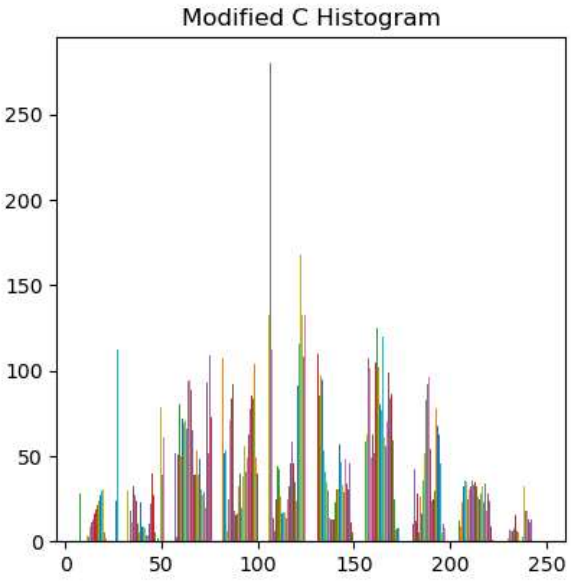
C_original.png

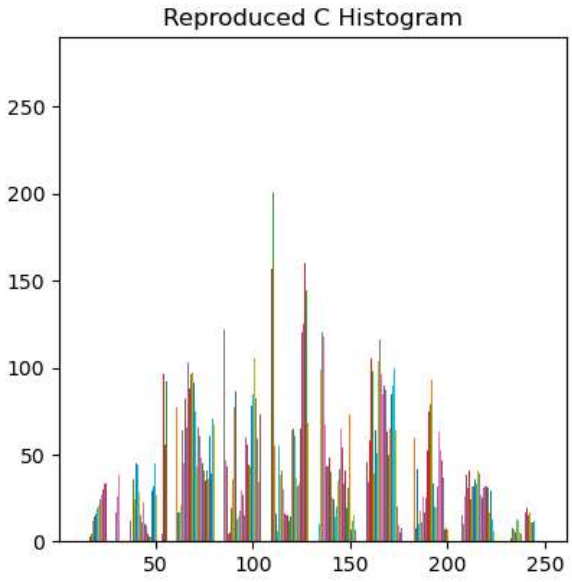
In [51]:
```
imageC = cv2.imread("images/C_original.png", cv2.IMREAD_GRAYSCALE)
modifiedC = cv2.imread("images/C_modified.png",cv2.IMREAD_GRAYSCALE)

filter_matrix = np.ones((13, 13), np.float32) / 169
# Spatial filtering işlemi
reproducedC = cv2.filter2D(imageC, -1, filter_matrix)

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageC, cmap='gray')
plt.title('Original C')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(imageC)
plt.title('Original C Histogram')


plt.subplot(2, 2, 2)
plt.imshow(modifiedC, cmap='gray')
plt.title('Modified C')
plt.axis('off')
```

```
plt.subplot(2, 2, 4)
plt.hist(modifiedC)
plt.title('Modified C Histogram')
plt.show()
#-----------------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedC, cmap='gray')
plt.title('Modified C')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedC)
plt.title('Modified C Histogram')


plt.subplot(2, 2, 2)
plt.imshow(reproducedC, cmap='gray')
plt.title('Reproduced C')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedC)
plt.title('Reproduced C Histogram')
plt.show()
```





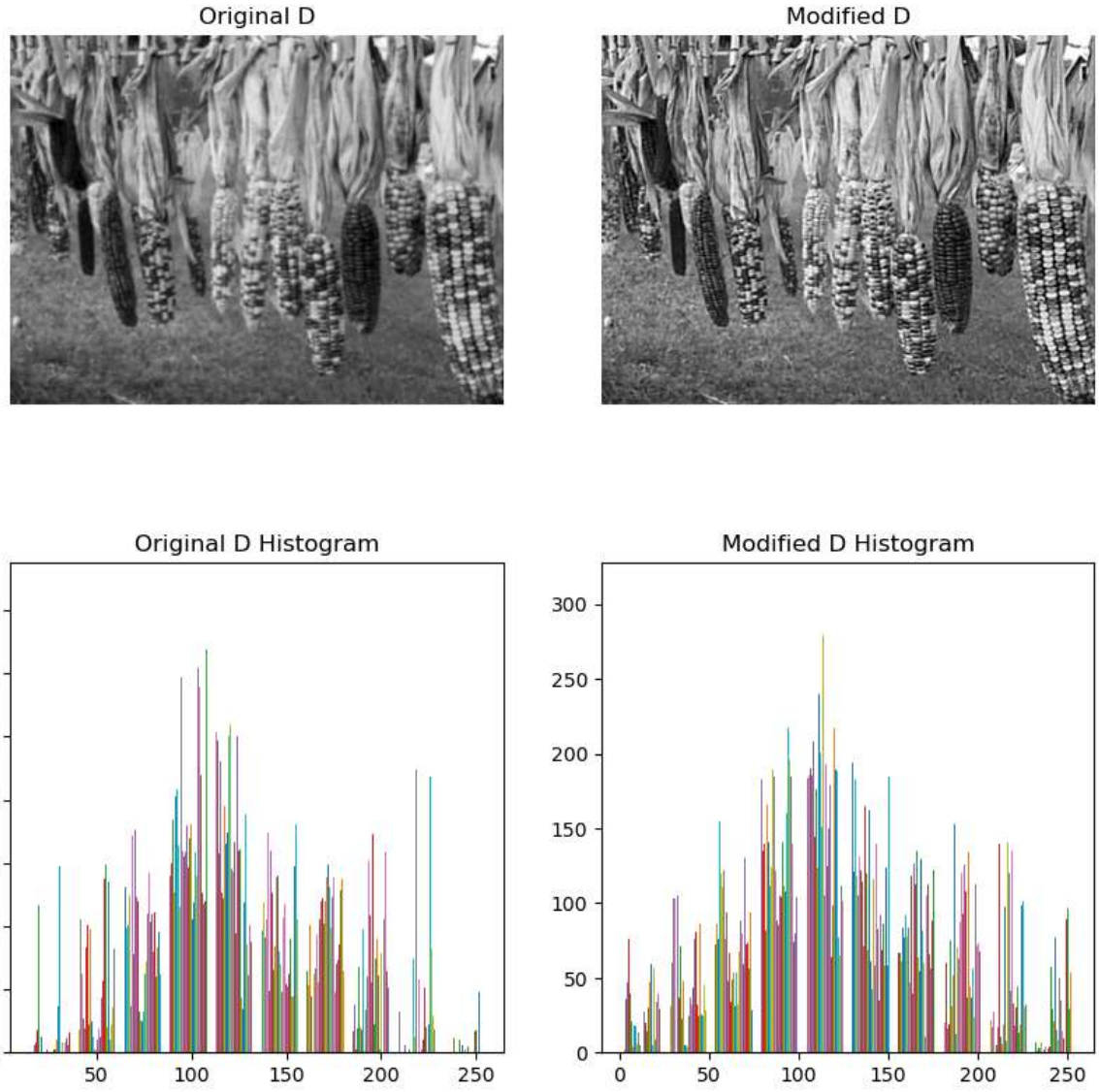


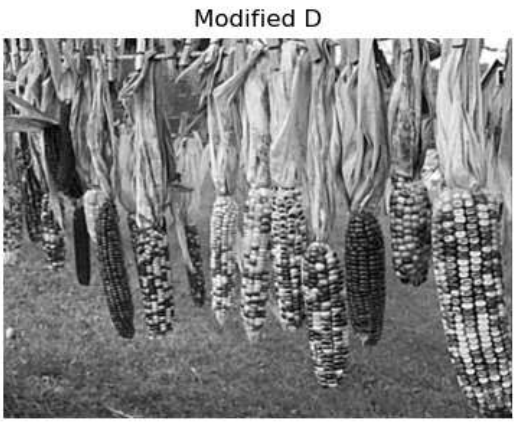


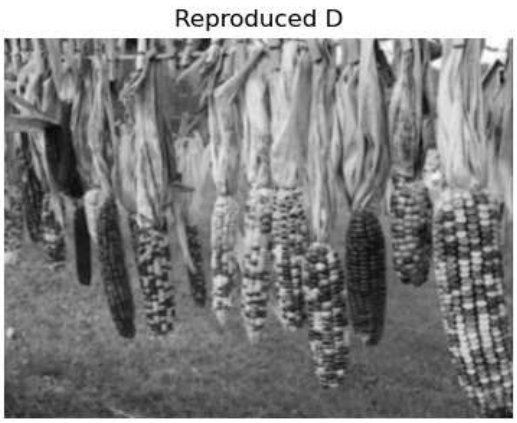
D_original.png

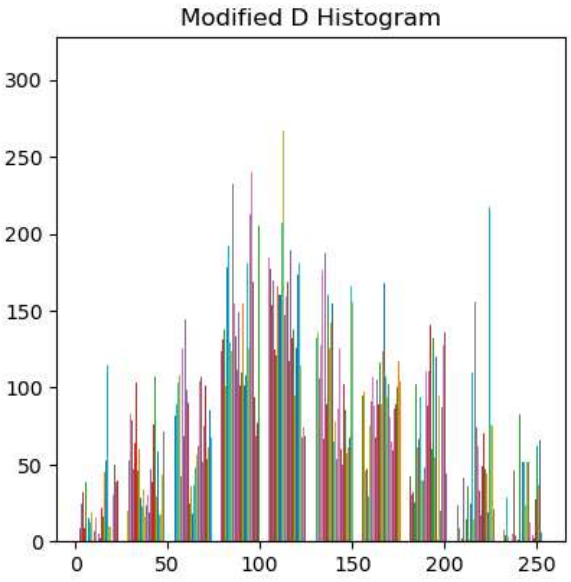
In [53]:
```
imageD = cv2.imread("images/D_original.png", cv2.IMREAD_GRAYSCALE)
modifiedD = cv2.imread("images/D_modified.png", cv2.IMREAD_GRAYSCALE)
#laplacian filter
laplacian_image = cv2.Laplacian(imageD, cv2.CV_64F)
laplacian_image = cv2.convertScaleAbs(laplacian_image)

reproducedD = imageD - laplacian_image
# Show the shapedned image

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageD, cmap='gray')
plt.title('Original D')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(imageD)
plt.title('Original D Histogram')

plt.subplot(2, 2, 2)
plt.imshow(modifiedD, cmap='gray')
plt.title('Modified D')
plt.axis('off')
```

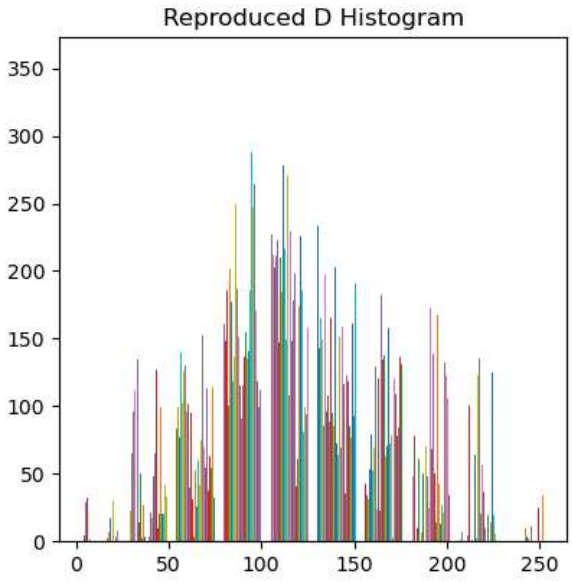
```
plt.subplot(2, 2, 4)
plt.hist(modifiedD)
plt.title('Modified D Histogram')
plt.show()
#-----------------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedD, cmap='gray')
plt.title('Modified D')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedD)
plt.title('Modified D Histogram')


plt.subplot(2, 2, 2)
plt.imshow(reproducedD, cmap='gray')
plt.title('Reproduced D')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedD)
plt.title('Reproduced D Histogram')
plt.show()
```







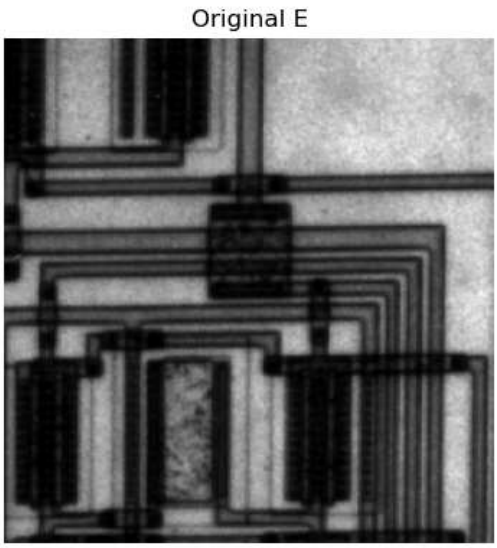


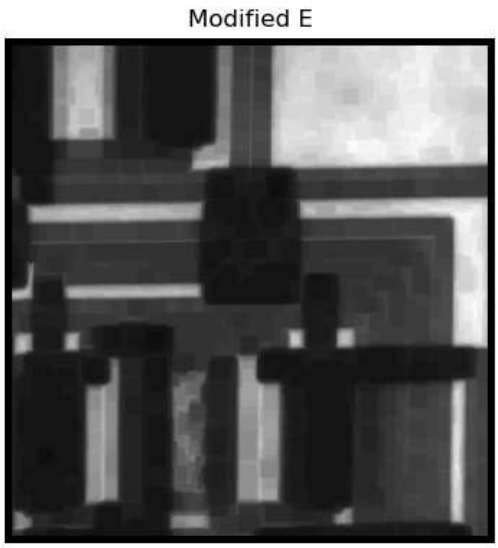


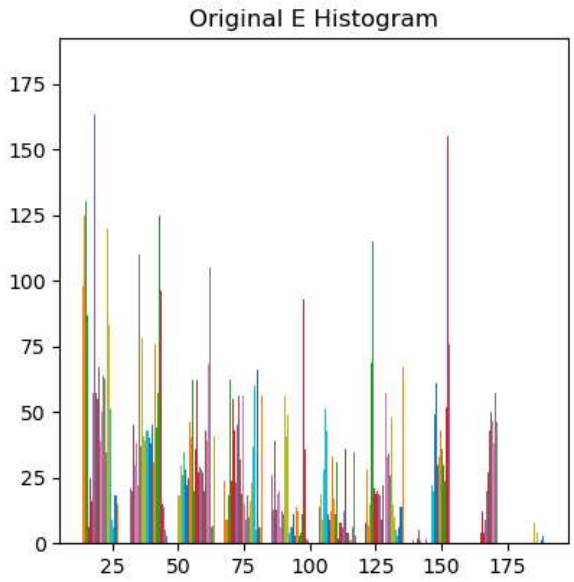
E_original.png

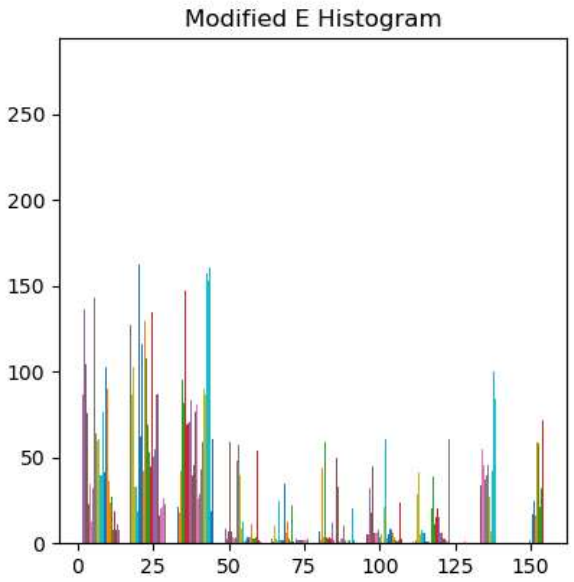
In [55]:
```
imageE = cv2.imread("images/E_original.png",cv2.IMREAD_GRAYSCALE)
modifiedE = cv2.imread("images/E_modified.png",cv2.IMREAD_GRAYSCALE)
# filtre boyutu 7x7
kernel_size = 7

# Minimum filtreyi uygulama
reproducedE = cv2.erode(imageE, np.ones((kernel_size, kernel_size), np.uint8))

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageE, cmap='gray')
plt.title('Original E')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(imageE)
plt.title('Original E Histogram')


plt.subplot(2, 2, 2)
plt.imshow(modifiedE, cmap='gray')
plt.title('Modified E')
plt.axis('off')
```

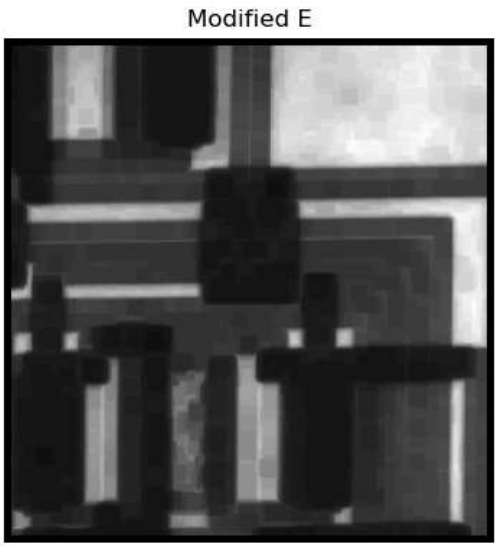
```
plt.subplot(2, 2, 4)
plt.hist(modifiedE)
plt.title('Modified E Histogram')
plt.show()
#-----------------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedE, cmap='gray')
plt.title('Modified E')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedE)
plt.title('Modified E Histogram')


plt.subplot(2, 2, 2)
plt.imshow(reproducedE, cmap='gray')
plt.title('Reproduced E')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedE)
plt.title('Reproduced E Histogram')
plt.show()
```

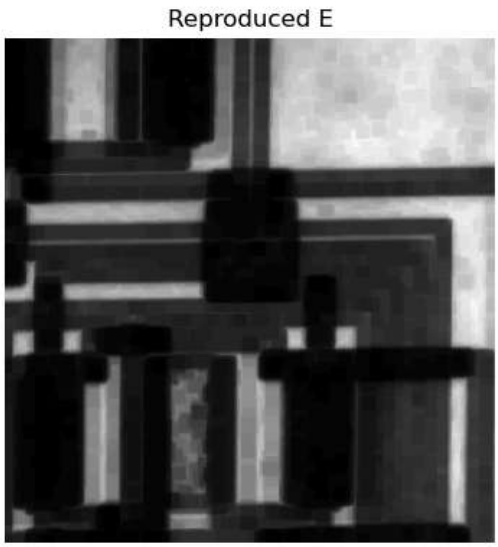


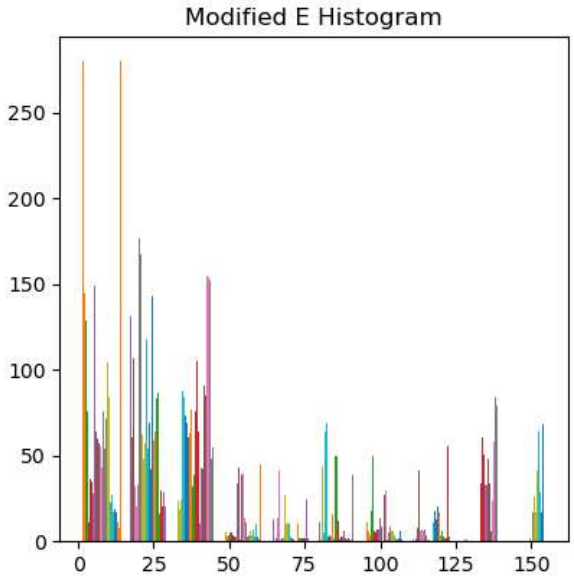


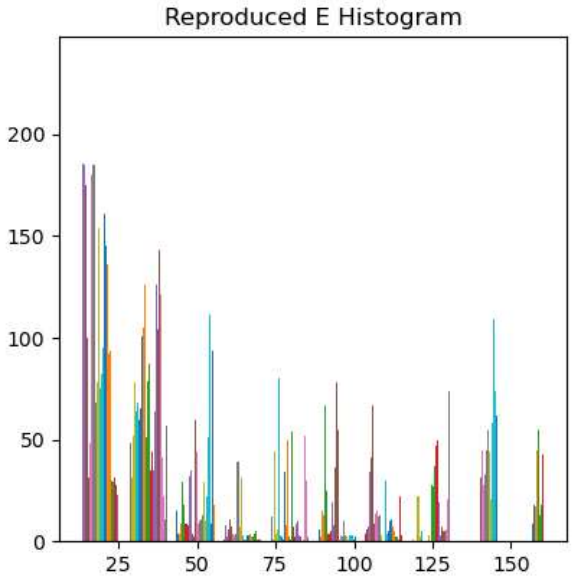










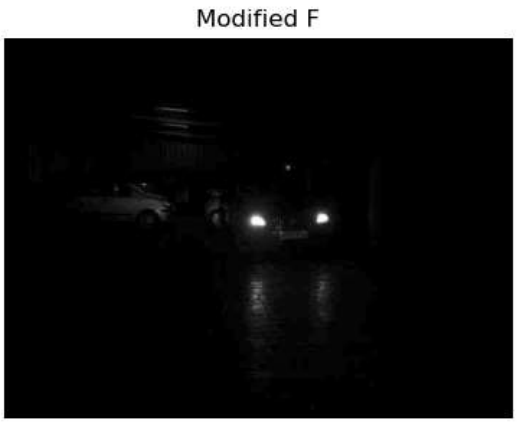


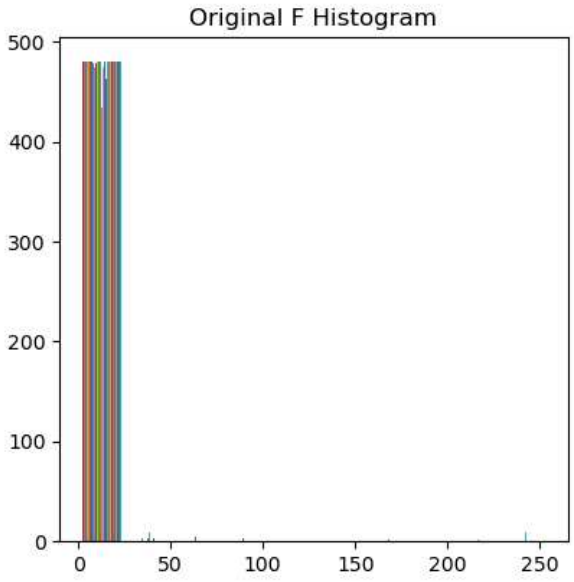
F_original.png

In [57]:
```
imageF = cv2.imread('images/F_original.png', cv2.IMREAD_GRAYSCALE)
modifiedF = cv2.imread('images/F_modified.png', cv2.IMREAD_GRAYSCALE)
# Gamma değeri
gamma1 = 0.6
 # Görüntüyü float32 türüne dönüştür
image_float = imageF.astype(np.float32)
# Gamma dönüşümü uygula
reproducedF = np.power(image_float, gamma1)

# 0 ile 255 arasına ölçekle
reproducedF = (reproducedF / np.max(reproducedF)) * 255

# Ölçeklenmiş görüntüyü uint8 türüne dönüştür
reproducedF = reproducedF.astype(np.uint8)

plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(imageF, cmap='gray')
plt.title('Original F')
plt.axis('off')

plt.subplot(2, 2, 3)
```

```
plt.hist(imageF)
plt.title('Original F Histogram')

plt.subplot(2, 2, 2)
plt.imshow(modifiedF, cmap='gray')
plt.title('Modified F')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(modifiedF)
plt.title('Modified F Histogram')
plt.show()
#----------------------------------
plt.figure(figsize=(10, 10))
plt.subplot(2, 2, 1)
plt.imshow(modifiedF, cmap='gray')
plt.title('Modified F')
plt.axis('off')

plt.subplot(2, 2, 3)
plt.hist(modifiedF)
plt.title('Modified F Histogram')


plt.subplot(2, 2, 2)
plt.imshow(reproducedF, cmap='gray')
plt.title('Reproduced F')
plt.axis('off')

plt.subplot(2, 2, 4)
plt.hist(reproducedF)
plt.title('Reproduced F Histogram')
plt.show()
```


Original F


Modified F


Original F Histogram
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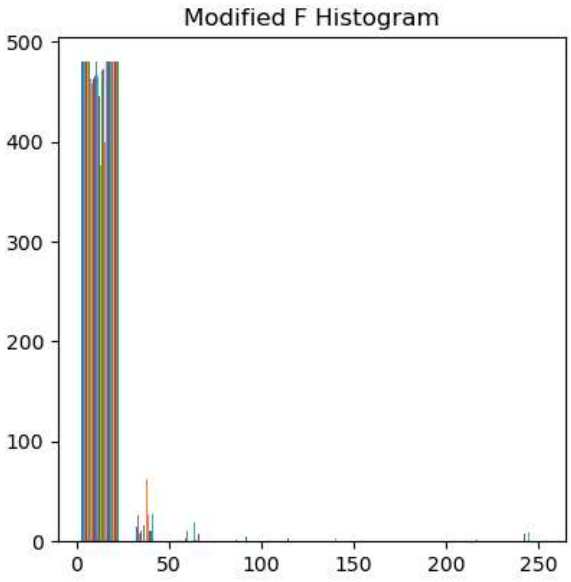
400
300
200
100
0
0
50
100
150
200
250


Modified F Histogram
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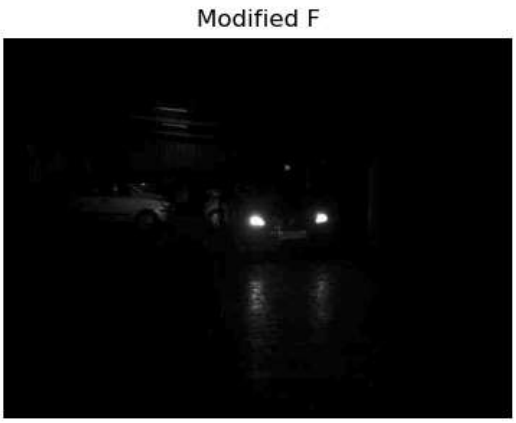
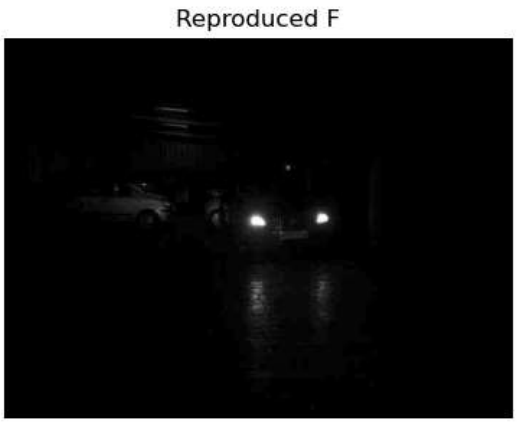
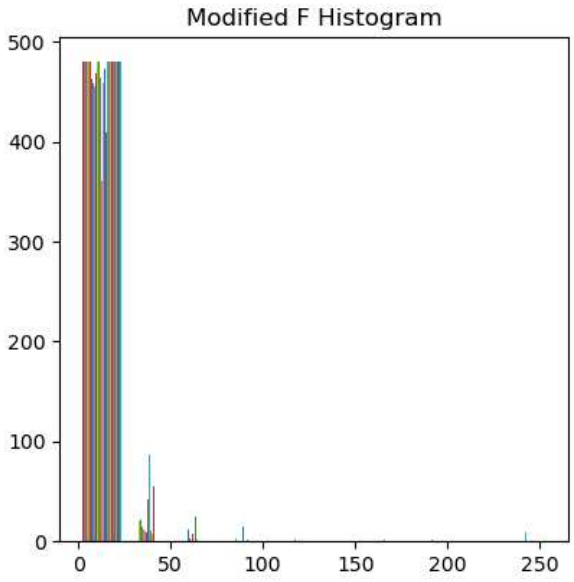
400
300
200
100
0
0
50
100
150
200
250


Modified F


Reproduced F


Modified F Histogram
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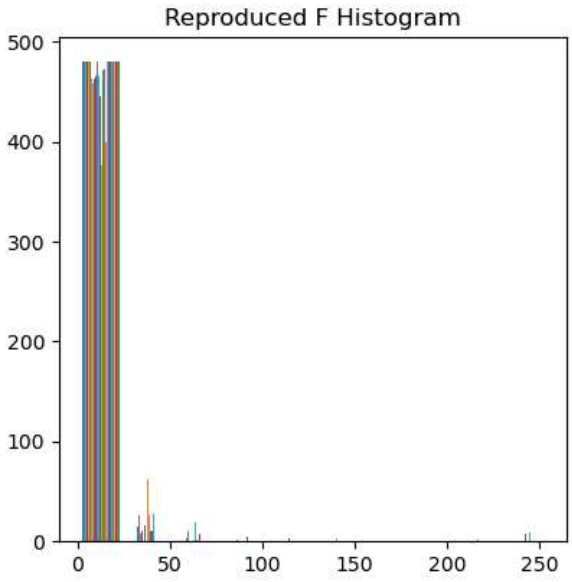
400
300
200
100
0
0
50
100
150
200
250


Reproduced F Histogram
500
400
300
200
100
0
0
50
100
150
200
250

In [ ]: