Fall 2021

California State University, Northridge

Department of Electrical and Computer Engineering

Computer Assignment 2
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ECE 551

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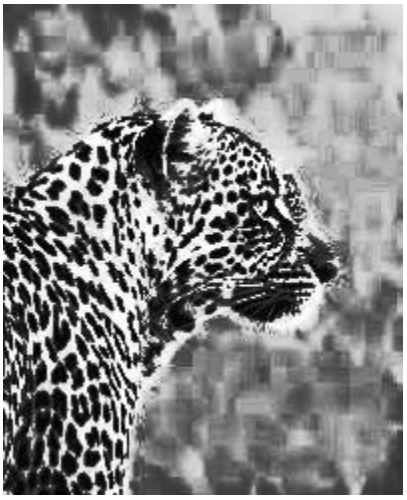
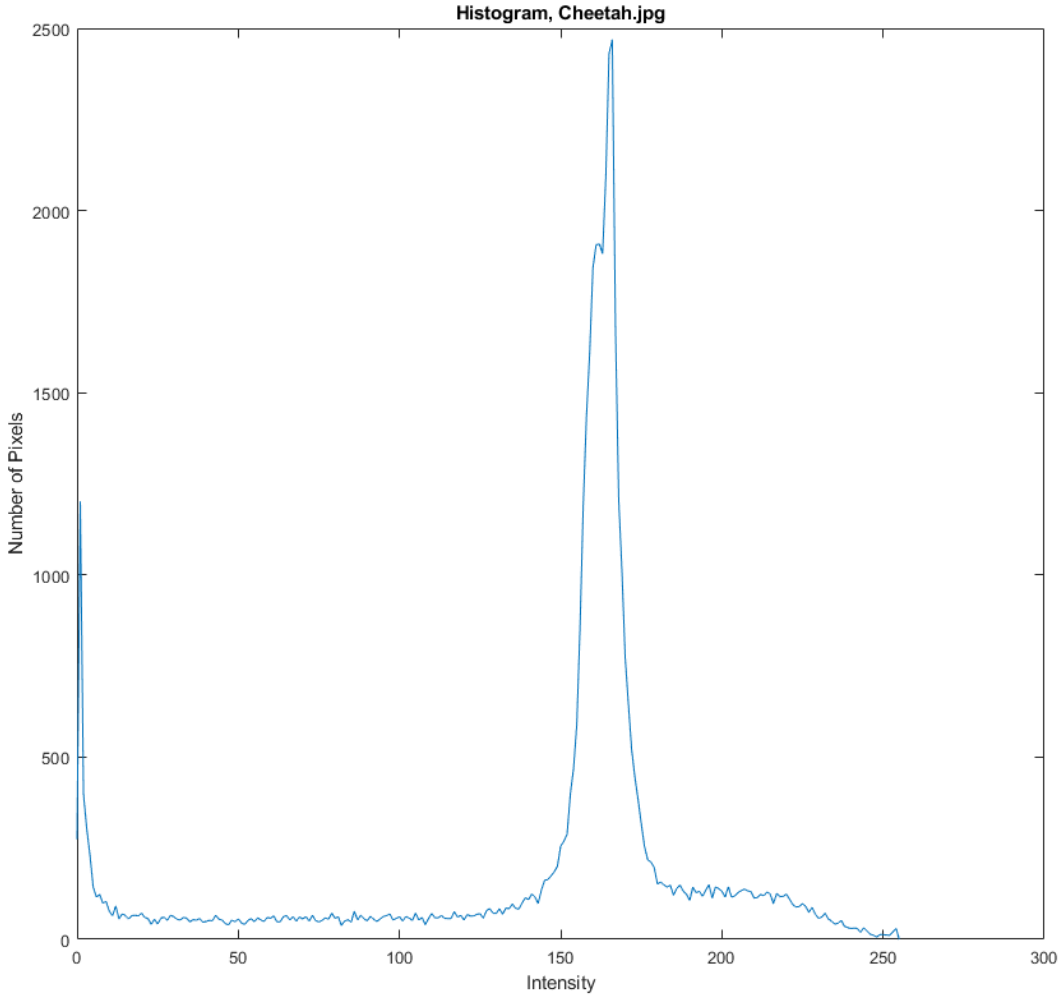
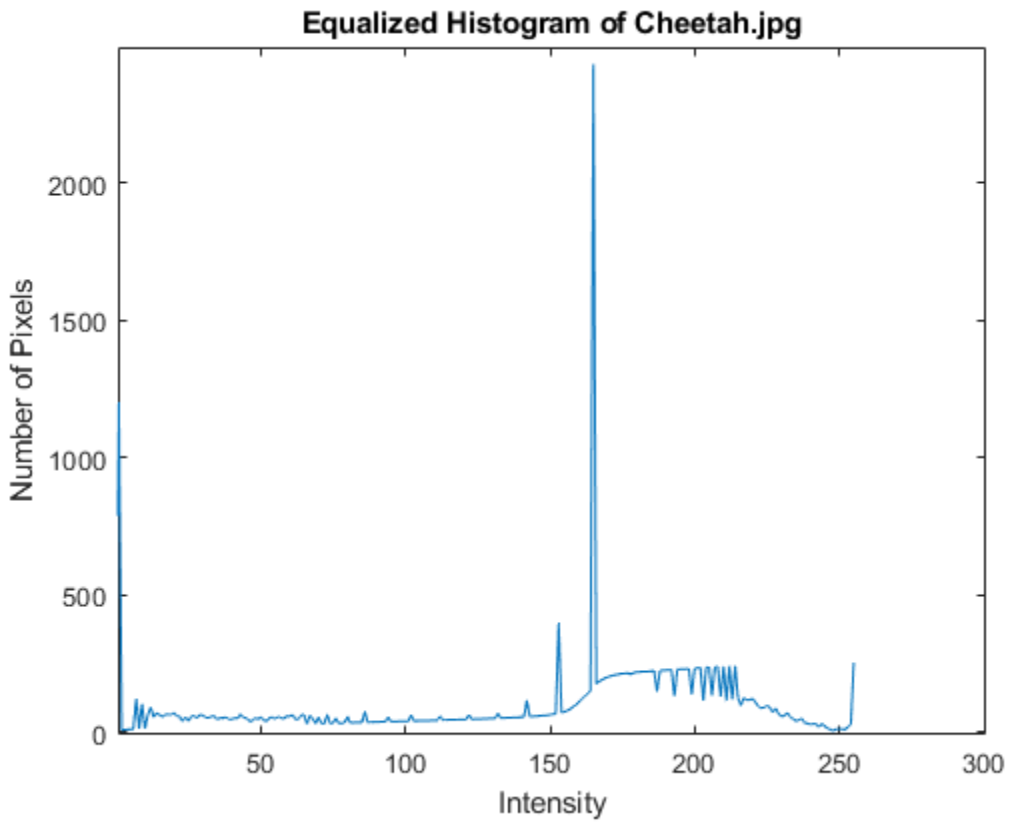
```
cheetah = rgb2gray(imread('cheetah.jpg'));
[x,y] = size(cheetah);
L = 0:255;
map = [L' zeros(256,1)];
hist = map;
for I = 1:x
   for J = 1:y
      hist(cheetah(I,J)+1,2)=hist(cheetah(I,J)+1,2)+1;
   end
end
figure
plot(hist(:,1),hist(:,2))
MN = x*y;
for I=1:256
   map(I,2) = hist(I,2)/MN;
   J = I-1;
   while J > 0
      map(I,2) = map(I,2)+hist(J,2)/MN;
      J = J-1;
   end
   map(I,2) = floor(256*map(I,2));
end
cheetah_eq = cheetah;
for I = 1:x
   for J = 1:y
      cheetah_eq(I,J) = map(cheetah(I,J)+1,2);
   end
end

imwrite(cheetah_eq, "cheetah_eq.jpg");

cheetah_eq_hist = map;
for I = 1:x
   for J = 1:y
      cheetah_eq_hist(cheetah_eq(I,J)+1,2)=hist(cheetah_eq(I,J)+1,2)+1;
   end
end
figure
plot(cheetah_eq_hist(:,1),cheetah_eq_hist(:,2))
```

Orignal Image



Equalized Image


Histogram, Cheetah.jpg
Number of Pixels
Intensity
0
500
1000
1500
2000
2500
0
50
100
150
200
250
300



Conclusion

Using the image histogram equalization technique discussed in class, I was able to improve the contrast in the picture of the cheetah. The histogram of the equalized image is more spread out than the original image, but it also not as smooth. I have some idea about why this happened: the histogram mapping caused the different pixel values in the original image to map to the same value, and excluded values in between. Though the equalized image has more contrast, the equalization caused the image to look less realistic. In the original image, the background is not noticeable which places the focus of the image on the cheetah. In the equalized image, the background pops out and takes attention away from the cheetah. I also noticed that the spike around 160 in the original image still appeared in the equalized image. The pixel intensity that was most prevalent in the original image still mapped to a single value.