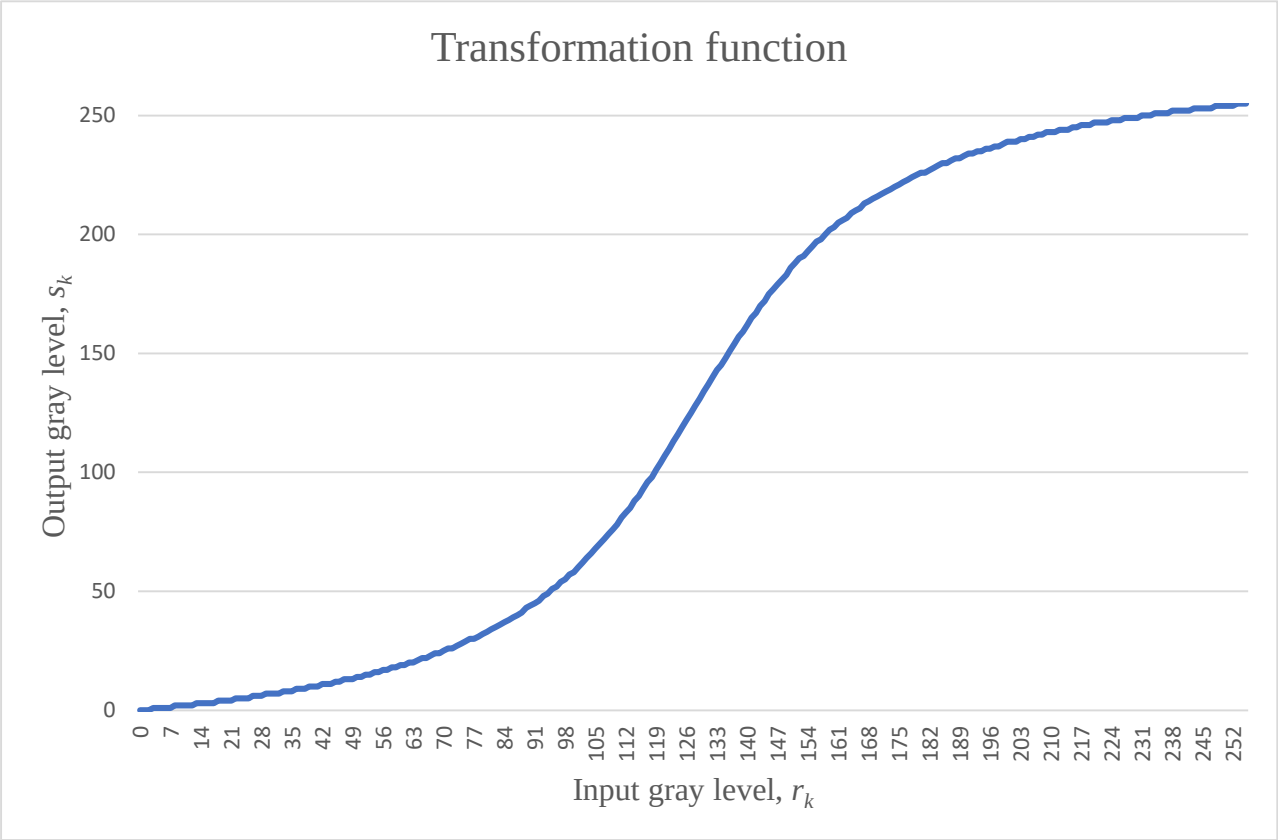
Project 1

1. Figure of the transformation function $s=T(r)$.



2. Table of transformation function to show the mapping from the input gray level r to the output gray level s.

r_k , k=0~255	s_k , k=0~255
0	0
1	0
2	0
3	1
4	1
5	1
6	1
7	1
8	2
9	2

10	2
11	2
12	2
13	3
14	3
15	3
16	3
17	3
18	4
19	4
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22	5
23	5
24	5
25	5
26	6
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244	253
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248	254
249	254
250	254
251	254
252	254
253	255
254	255
255	255

3. Figure of the output image after applying the intensity transformation function.

Figure 1. Original image

Figure 2. Output image

4. Figures of the original and output histograms.

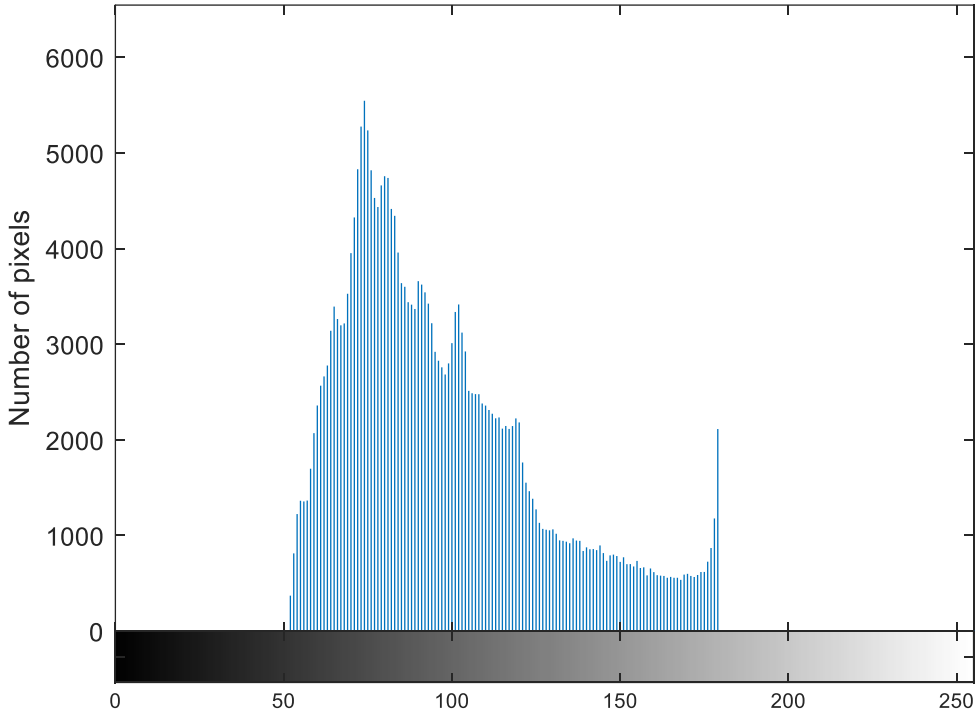

Figure 3. Original histograms

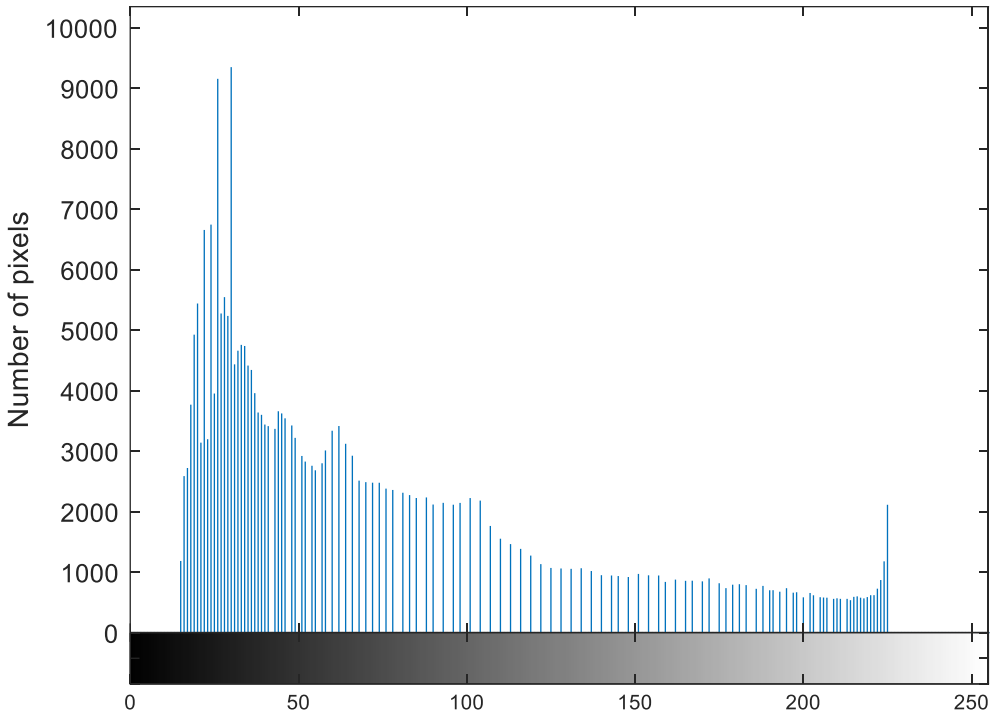

Figure 4. Output histograms

Source code:

```
% Read the image, data type: uint8
img = imread('Bird feeding 3 low contrast.tif');
[m,n] = size(img);


% Show the input image (Bird feeding 3 low contrast.tif)
figure
imshow(img)
title('Original image')


% Show the input histograms
figure
imhist(img)
```

```
ylim([0 (max(imhist(img))+1000)])
ylabel('Number of pixels')
title('Original histograms')


% Calculate table of transformation function to show the mapping from the input gray
level r to the output gray level s
table(:,1) = [0:255];
s = zeros(256,1);
for ii = 1:256
      s(ii) = atan(((ii-1)-128)/32);
end
length = (max(s) - min(s));

for ii = 1:256
      table(ii,2) = uint8(255/length*(s(ii) - min(s)));
end


% Show the figure of transformation function
figure
plot(table(:,1),table(:,2))
xlabel('input gray level, r')
ylabel('output gray level, s')
xlim([0,255])
ylim([0,255])
grid
title('Transformation function')


% Apply the intensity transformation function by using the table
img_output = zeros(m,n);
for i = 1:m
    for j = 1:n
          img_output(i,j) = table(img(i,j)+1,2);
    end
end
img_output = uint8(img_output);
```

```
% % Show the output image
figure
imshow(img_output)
title('Output image')


% Show the output histograms
figure
imhist(img_output)
ylabel('Number of pixels')
ylim([0 (max(imhist(img_output))+1000)])
title('Output histograms')
```