Digital Image Processing

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Problem 1 Requirement

1. Histogram Equalization (test images: fig1.jpg, fig2.jpg)

(a) Write a computer program for computing the histogram of an image.

(b) Implement the histogram equalization technique.

(c) Your program must be general to allow any gray-level image as its input.

As a minimum, your report should include the original image, a plot of its histogram, a plot of the histogram-equalization, transformation function, the enhanced image, and a plot of its histogram.

Problem solutions

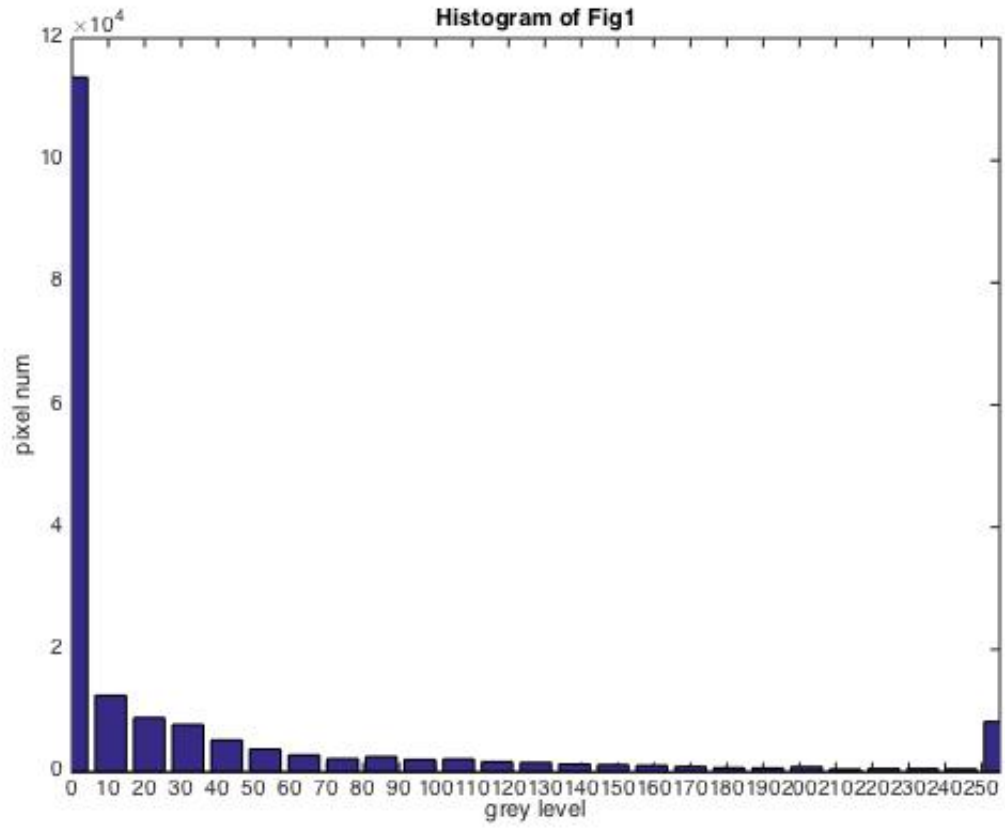
code of histogram of Fig1

MATLAB

```
f = imread('Fig1.jpg');
h = imhist(f,25);
horz = linspace(0,255,25);
bar(horz,h);
axis([0 255 0 120000]);
set(gca,'xtick',0:10:255);
xlabel('grey level');
ylabel('pixel num');
title('Histogram of Fig1');
```

original Fig1

histogram of Fig1



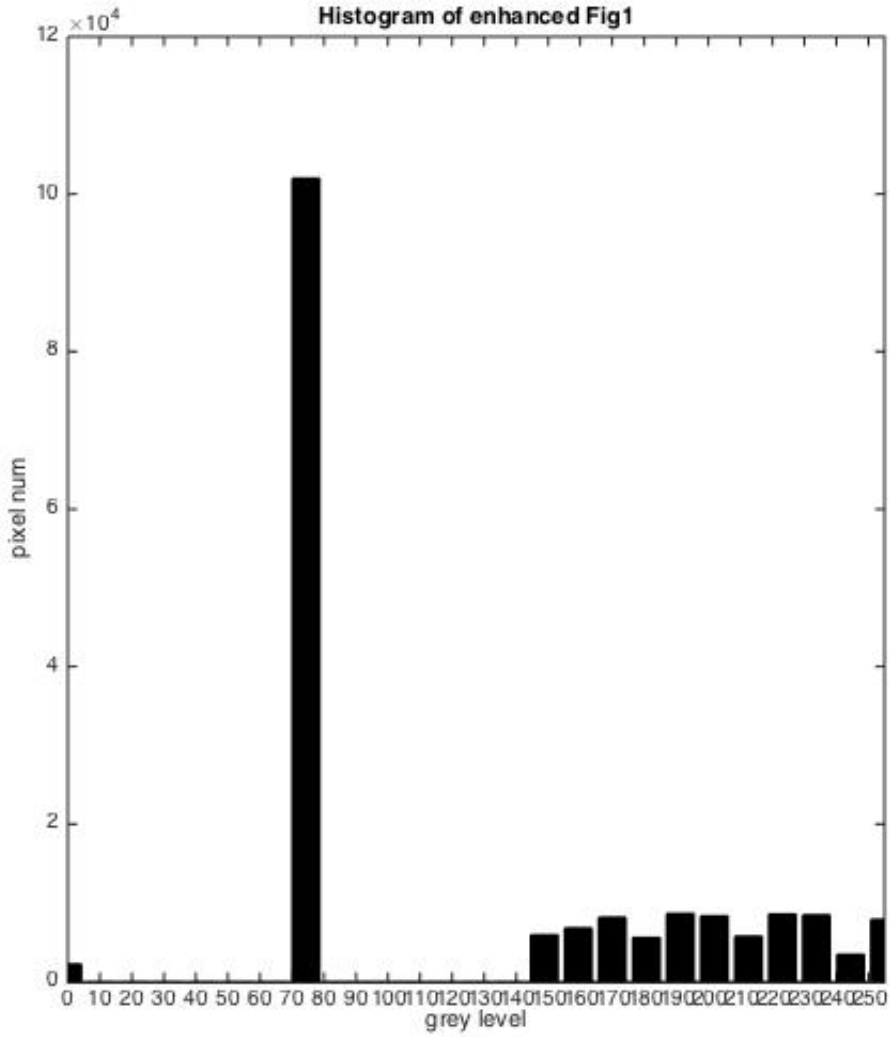
code of equalization of Fig1

MATLAB

```
f = imread('Fig1.jpg');
eq_f = histeq(f);
imshow(eq_f);
h = imhist(eq_f,25);
horz = linspace(0,255,25);
bar(horz,h);
axis([0 255 0 120000]);
set(gca,'xtick',0:10:255);
xlabel('grey level');
ylabel('pixel num');
title('Histogram of enhanced Fig1');
```

enhanced Fig1

histogram of enhanced Fig1

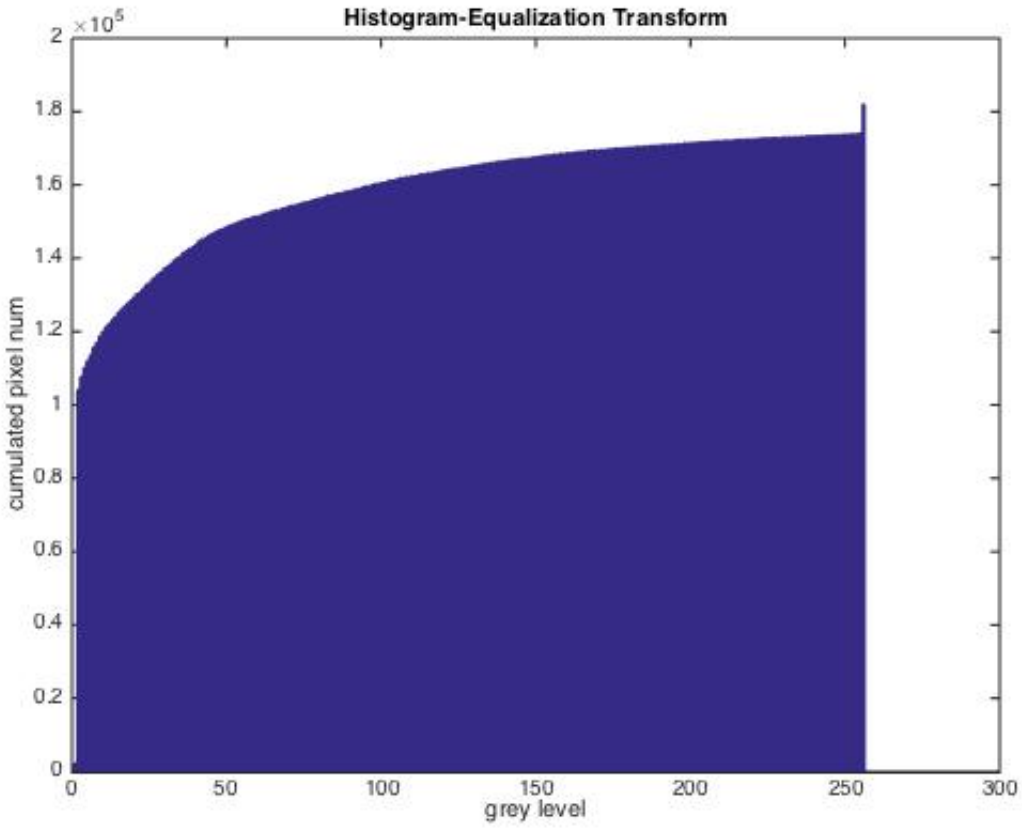


code of histogram-equalization transform

MATLAB

```
f = imread('Fig1.jpg');
h = imhist(f);
cum_h = cumsum(h);
bar(cum_h);
xlabel('grey level');
ylabel('cumulated pixel num');
title('Histogram-Equalization Transform');
```

histogram-equalization transform function


Histogram-Equalization Transform
×10^5
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
cumulated pixel num
0
50
100
150
200
250
300
grey level