Sample 2-3

画像データの入出力

輝度値変換

画像処理特論

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動作確認: MATLAB R2023a

Input and output of images

Intensity transforms

Advanced Topics in Image Processing

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Verified: MATLAB R2023a

サンプル画像の準備

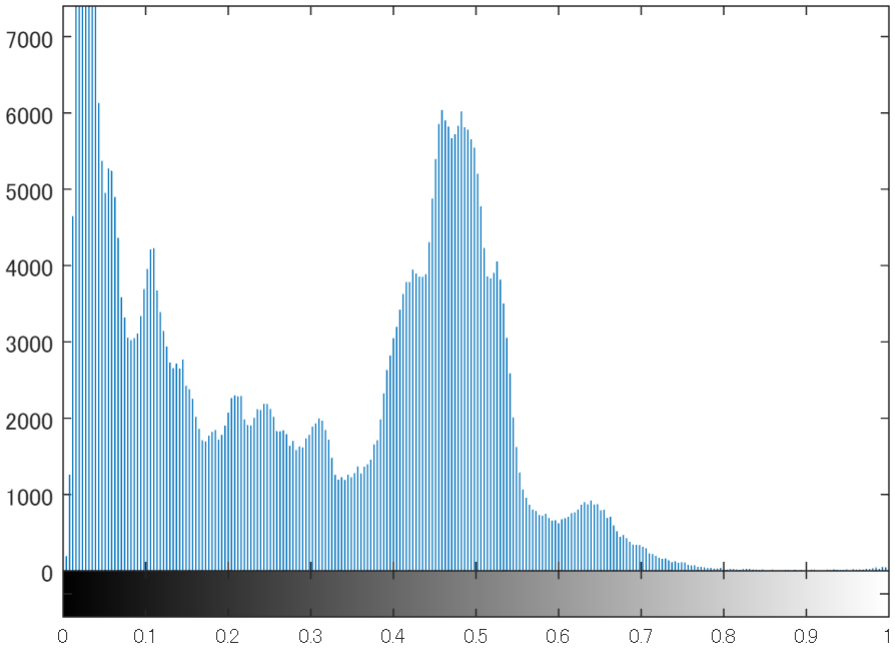
(Preparation of sample image)

本サンプルで利用する画像データを収めた data フォルダにパスをとおす。

Create a path to the data folder that contains images used in this sample.

```
addpath('./data')
close
% Reading original image
I = im2double(rgb2gray(imread('firenzeRgb.jpg')));
figure(1)
imshow(I)
title('Original')
```


```
figure(2)
imhist(I)
```

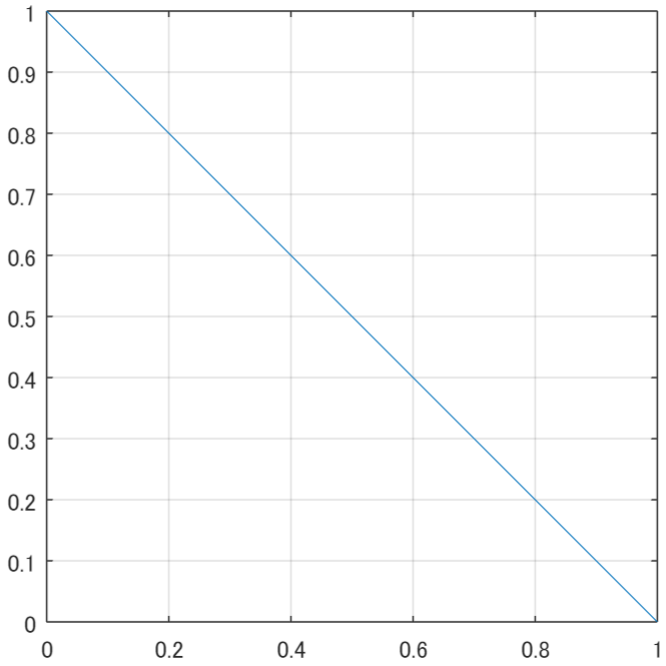


ネガ変換

(Negative conversion)

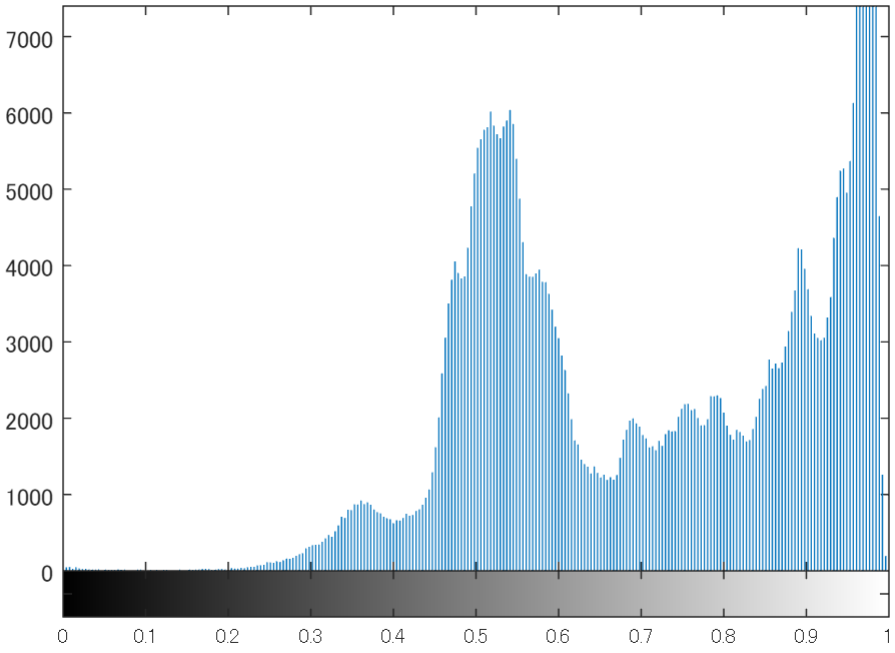
$$y = T(x) = 1.0 - x$$

```
% Definition of negative conversion
Tn = @(x) 1.0-x;
figure(3)
fplot(Tn,[0,1])
axis square
grid on
```




```
% Negative conversion of image I
J = Tn(I);
figure(4)
imshow(J)
title('Negative')
```


```
figure(5)
imhist(J)
```



対比伸長

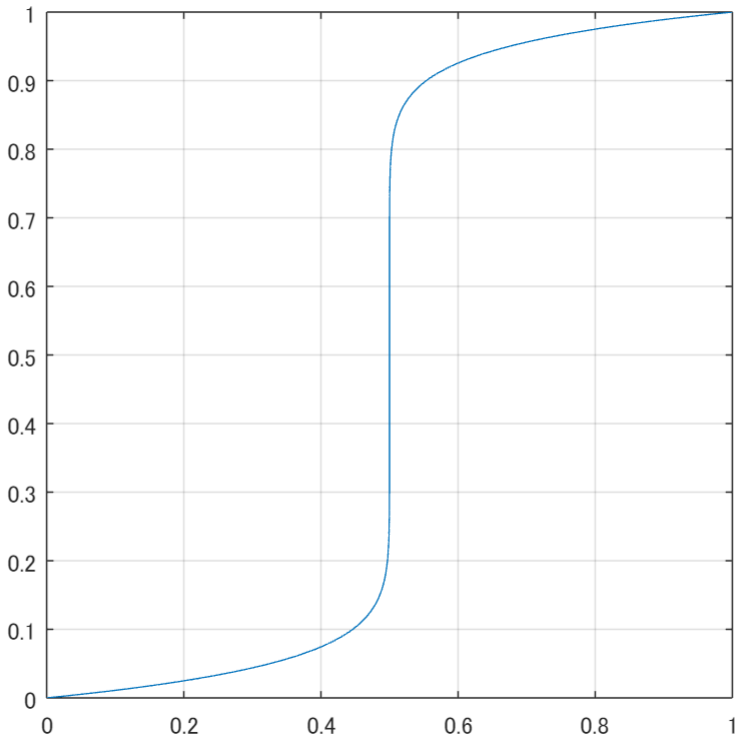
(Contrast stretching)

$$y = T(x) = \frac{1}{2}(\text{sign}(2x-1)|2x-1|^{10^{-\alpha}} + 1)$$

```
% Definition of contrast stretching
alpha = 1
```

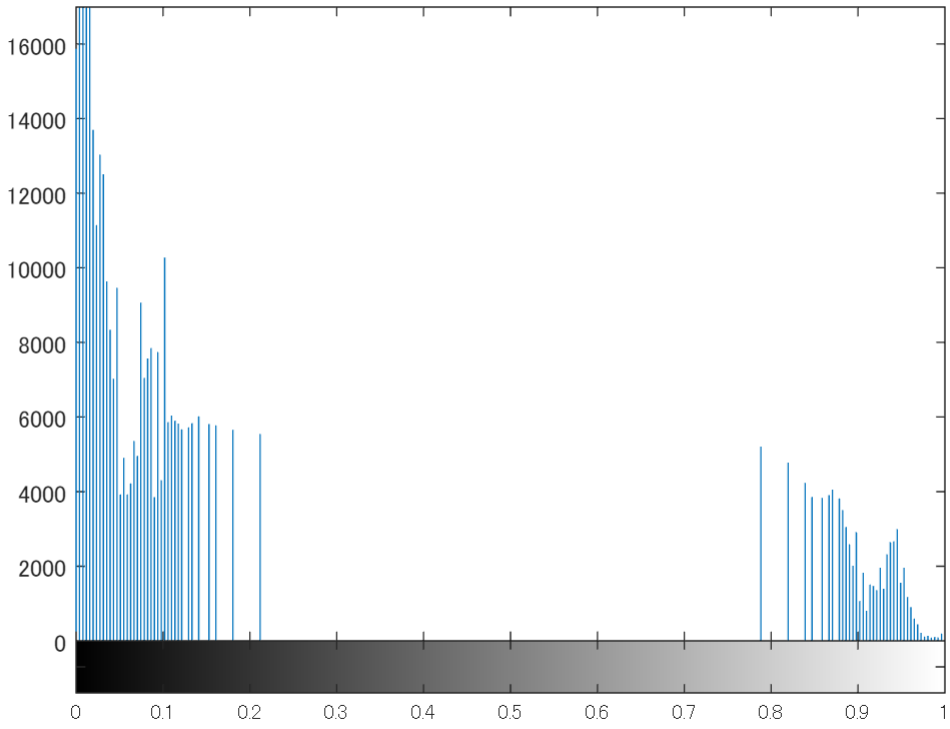
```
alpha = 1
```

```
Tc = @(x) 0.5*(sign(2.0*x-1.0).*abs(2*x-1.0).^(10^(-alpha))+1.0);
figure(6)
fplot(Tc,[0,1])
axis square
grid on
```




```
% Contrast stretching of image I
K = Tc(I);
figure(7)
imshow(K)
title('Contrast stretching')
```


```
figure(8)
imhist(K)
```



べき乗則変換

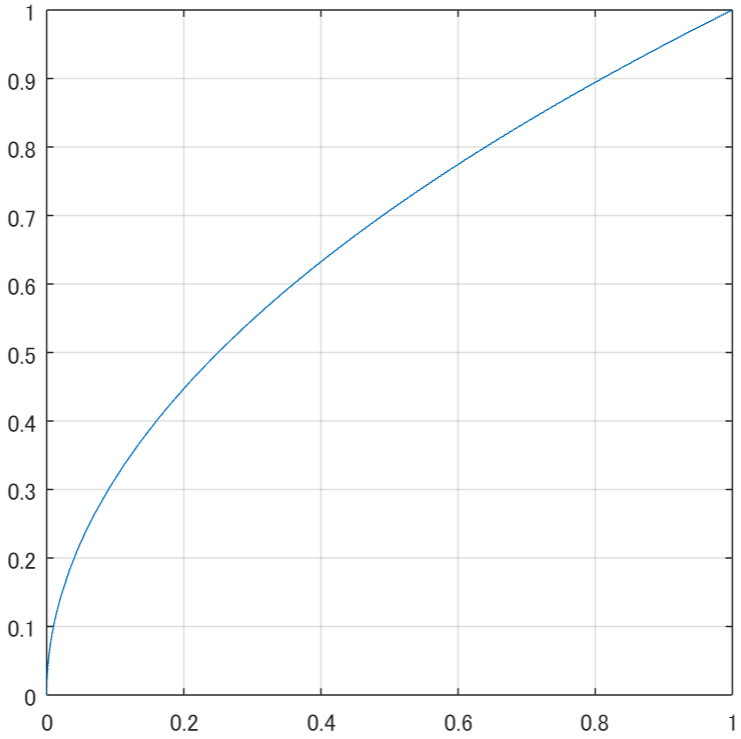
(Power law conversion)

$$y = T(x) = x^{\gamma}$$

```
% Definition of power law conversion
gamma = 0.5
```

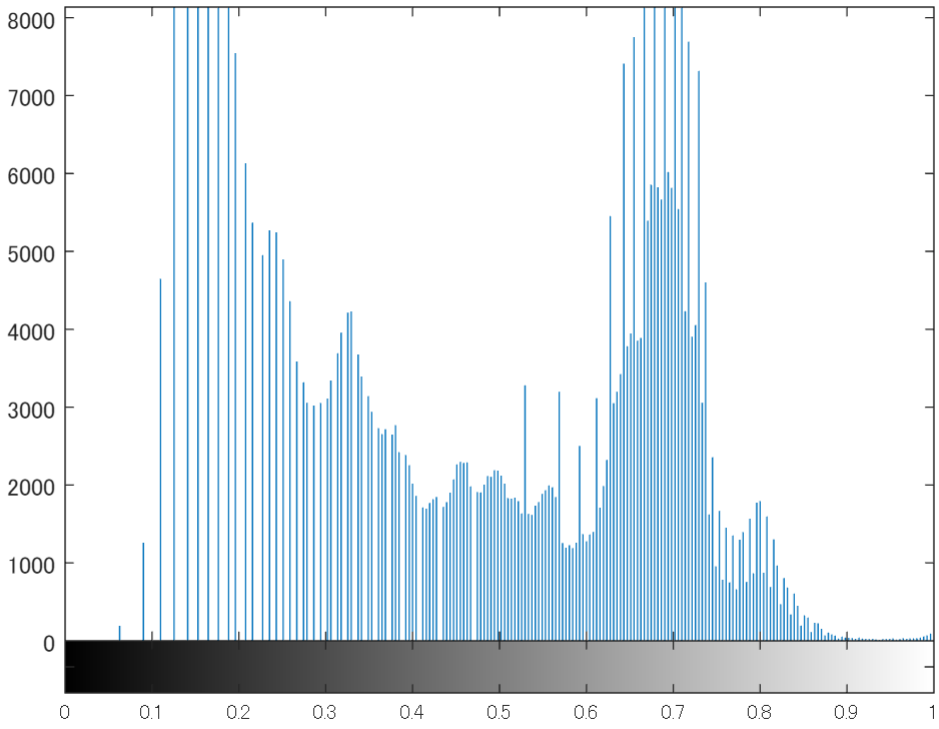
```
gamma = 0.5000
```

```
Tp = @(x) x.^gamma;
figure(9)
fplot(Tp,[0,1])
axis square
grid on
```




```
% Power law conversion of image I
L = Tp(I);
figure(10)
imshow(L)
title('Power law conversion')
```


```
figure(11)
imhist(L)
```



輝度値調整関数

(Image adjustment function)

IMADJUST は高機能な輝度値調整関数で，uint8 型画像に対してもべき乗則変換を含めた細かい調整が可能

IMADJUST is a sophisticated intensity adjustment function that allows fine tuning of images including uint8-type ones, such as power law conversion.

```
% Parameter setting of power law conversion
gamma = 0.5
```

```
gamma = 0.5000
```

```
% Conversion to uint8
U = im2uint8(I);
% Power law conversion with IMADUST function
M = imadjust(U,[],[],gamma);
figure(12)
imshow(M)
title('Power law conversion with IMADJUST')
```


```
figure(13)
imhist(M)
```